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Loch Lomond and The Trossachs National Park

Valuing the National Park

Final Report

Prepared for: Loch Lomond and The Trossachs National Park Authority

Date: July 2011



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Abbreviations

ABS	Annual Business Survey
ALLFV	Argyll, Loch Lomond and Forth Valley
BR	Business Register
BRES	Business Register Employment Survey
CREA	Comprehensive Regional Economic Account
CS	Consumer Surplus
CVM	Contingent Valuation Method
DREAM®	Detailed Regional Economic Accounting Model
DZ	Data zone
GDP	Gross Domestic Product
GVA	Gross Value Added
KLEMS	Capital (K), Labour (L), Energy (E), Materials (M) and Services (S)
LLTNP	Loch Lomond and The Trossachs National Park
MOD	Ministry of Defence
N2K	natura 2000
NEV	Net Economic Value
NNR	National Nature Reserve
NP	National Park
NPA	National Park Authority
NR	National (Cycle) Route
NUTS	Nomenclature of Units for Territorial Statistics
OA	Output Area
ONS	Office for National Statistics
QALY	Quality Adjusted Life Year
SAC	Special Area of Conservation
SEEA 2003	The United Nation's Integrated Environmental and Economic Accounting 2003
SIC	The UK Standard Industrial Classification of Economic Activities
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SUTS	Price supply and use tables
TCM	Travel Cost Method
TEV	Total Economic Value
WTP	Willingness to Pay / Willing to Pay

Executive summary

Introduction

The Loch Lomond and the Trossachs National Park generates an estimated value of **£866m per year**, of which only about half goes through the market. In other words the **National Park generates as much value that is not recorded in conventional systems as that which is**. The extra is made up of public enjoyment of the natural assets and resources, of values in excess of what consumers actually pay, and of ecosystem services rendered to the world at large.

Many of the most valuable things in our lives - our health, education, parks, museums, gardens, walks and even the air we breathe - are free at the point we use them. Even those things we pay for are normally more valuable to us than the price we paid. Over the years economists have developed a range of methods for trying to identify the total value of a specific good or service. This project is a first attempt at a comprehensive evaluation of all activity within The Loch Lomond and Trossachs National Park.

The Park is a particularly appropriate study area because so many of the services provided, especially those known as eco systems services, are not priced. This study follows that carried out five years ago which focused on activities covered by the market. The study therefore allows some comparisons looking backward and, importantly, a base for valuation studies in future. The accounting framework developed for adding up the Park's value is in sympathy with initiatives to go 'beyond GDP', while remaining rigorous and consistent with United Nations and EU standards. It sheds light on the contribution of structures, policies and authorities to the Park's value and can allow comparative assessment against other areas.

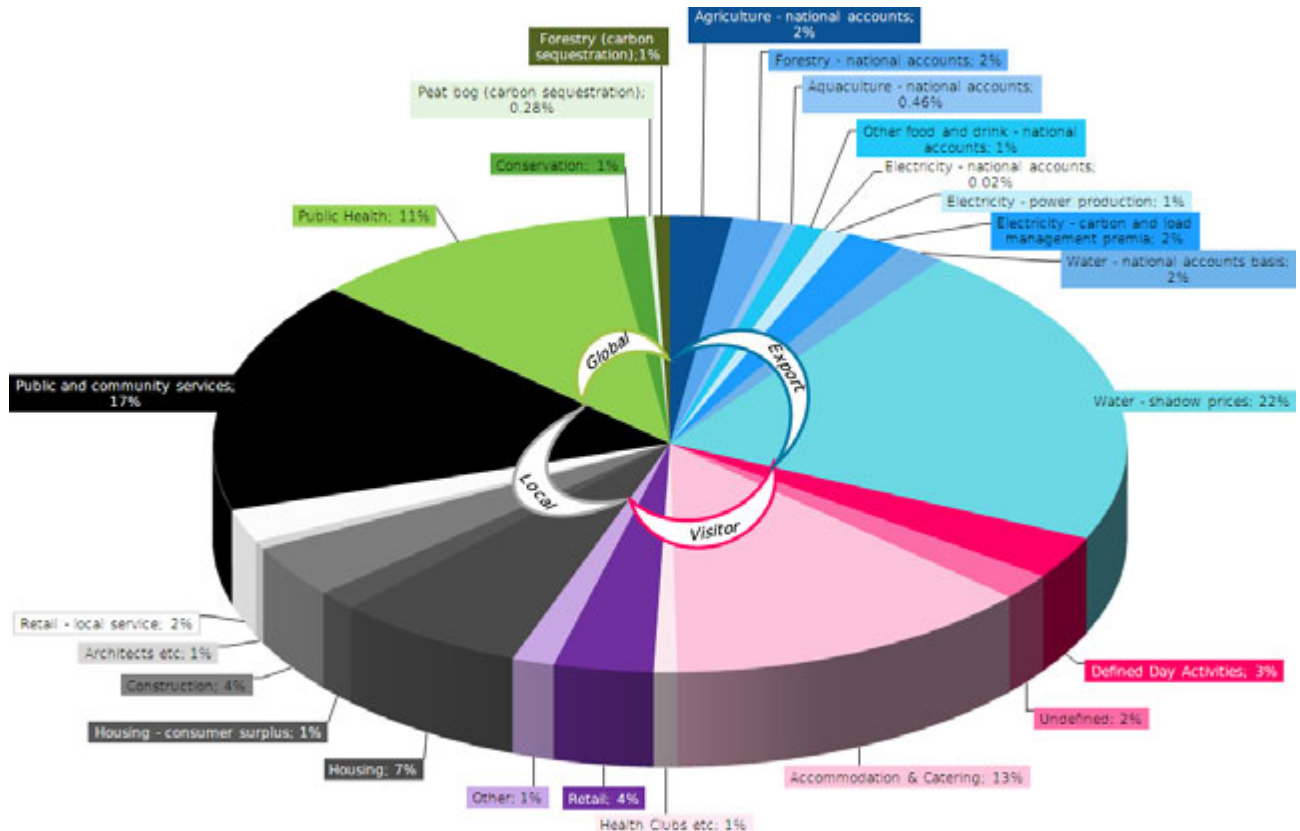
The Total Value of the Park

For the purposes of analysis we have defined four channels through which the Park's value is realised:

1. **Export** consists of products that are primarily sold outside the Park. In two cases, electricity and water, the "price" at which they are sold appear substantially lower than the value of the product. For example the value of water supplied from the Park as it appears to figure in the official the regional accounts is £13.9m per year, whilst the estimated replacement cost if the Park water were not available is £188.1m.
2. **Visitor goods and services** include the accommodation and food supplied by the hospitality industry, leisure and entertainment services such as pleasure boating and sports clubs (especially golf), retail outlets oriented to visitors, and also near-free activities such as hillwalking, sightseeing, bird watching and water activities.
3. **Local goods and services** is the output produced in the Park chiefly for the consumption of locals or the development of the Park. Most important of these is housing, but also significant are public services such as health and education, those parts of retailing and hospitality that are predominantly used by locals, and construction.
4. **Global services** relate to non-market activities with no clearly identifiable consumers other than the people of Scotland and the world at large.

Export Services comprise a third of the total annual value of the National Park at 32%, followed by **Local Services** at 31%, **Visitor Services** at 24%, and finally **Global Services** at 13%. When we break these down, four particular streams of value dominate the National Park's economy, as shown in Figure 0.1.

Figure 0.1 Value Streams in the Production Account (Total)



Indeed:

- **Water** services constitute 24% of the total annual value of the National Park,
- **Public health** derived mainly from exercise constitutes 11% of the total annual value,
- **Visitor accommodation & catering services** constitute 13% of the total annual value, and
- **Public and community services** constitute 17% of the total annual value of the National Park.

These reflect the importance of the non-market value produced by the National Park, with Loch Katrine's use as a reservoir; the glens, bens and lochs offering opportunities for recreation and sport impacting positively on participants' health; the accommodation sector which relies on the surrounding environment for views as well as activities for their guests; and housing where house prices reflect in part the surrounding landscape.

Amongst the market activities, **tourist accommodation, licensed restaurants and other visitor services dominate the 211 industries present in the National Park**. Of those, 55 industries demonstrate twice the economic activity compared to UK norms, in particular forestry, pleasure boating, holiday accommodation and aquaculture. Most of the most significant industries are tourism-related.

We have attempted an apportionment of these value streams amongst the Park's assets and other inputs that contribute to their production. This too, of course, must lean heavily on assumptions. The most important factors of production used to produce the goods and services in the LLTNP:

- **Land** produces 41%, and has particular importance for *Global Services* and the production of *Export Goods and Services*;
- The **built and manufactured capital** produces 15% of total value, much of it through the *Visitor Services Economy*;
- Inputs of **materials and services** also contribute 27% of total value, half of it for *Local Goods and Services*; and
- People (**human capital or labour**) contribute 17% of the value of the National Park, concentrated in the visitor based industries.

The full report contains a register of these assets, and a catalogue of the activities in the Park that were found measurable economically. For human capital the asset register explores Park demography.

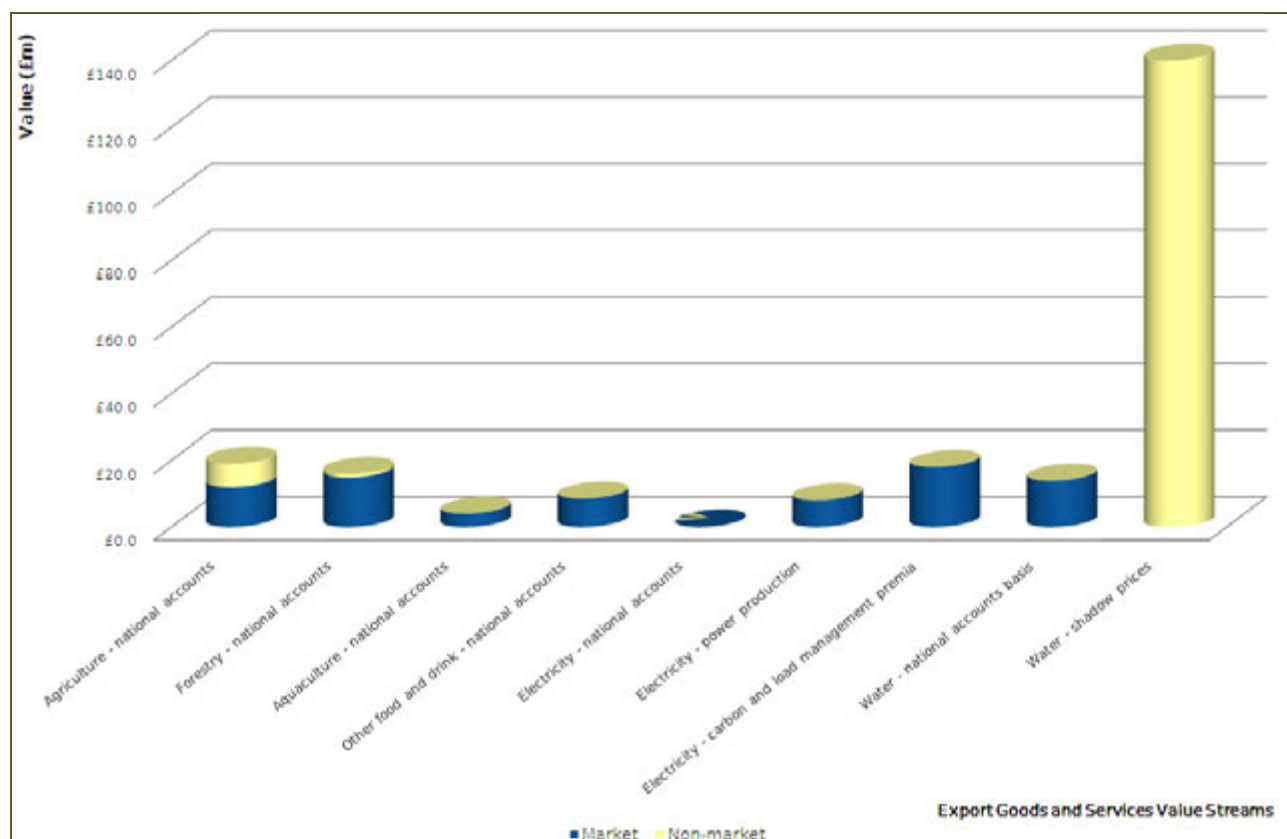
Table 0.1, Table 0.2 and Table 0.3 summarise the value streams and the attributions we have made. For a full description of their construction and meaning see the full report.

Export Services

Table 0.1 The Production Account: Export Goods & Services

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non- market
Export Goods and Services	£158.8	£63.0	£34.1	£34.1	£275.4	£79.4	£196.1
Agriculture - national accounts	£1.0	£1.0	£10.0	£7.0	£19.0	£12.0	£7.0
Forestry - national accounts	£1.4	£1.4	£3.7	£9.4	£15.8	£14.9	£1.0
Aquaculture - national accounts	£0.1	£0.6	£0.8	£2.5	£4.0	£4.0	
Other food and drink - national accounts	£0.2	£0.6	£2.3	£5.4	£8.5	£8.5	
Electricity - national accounts		£0.1	£0.0	£0.0	£0.1	£0.1	
Electricity - power production	£3.4	£3.4	£0.2	£1.0	£8.0	£8.0	
Electricity - carbon and load management premia	£10.0	£8.0			£18.0	£18.0	
Water - national accounts basis		£2.6	£2.5	£8.8	£13.9	£13.9	
Water - shadow prices	£142.7	£45.4			£188.1		£188.1

Figure 0.2 Export Goods and Services: values going through the market or not



Farming in the National Park consists mostly of sheep grazing on ‘less favoured’ land. In total, there are some 350 farms in the National Park farmed by 200 occupiers. The total workforce is around 540 with a further 100 employed in

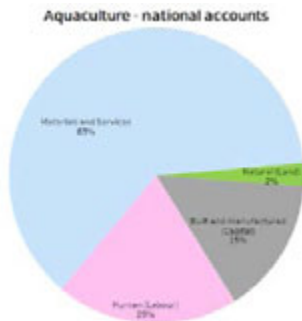
supporting agricultural services and hunting and estate activities. Sales, and therefore the value stream, are estimated at £19m and the GVA at £7m.

Other food related activities include £8m worth of sales and £3m of GVA are in the bakery business and the Park also has a small fruit wine business.

Woodlands and forests, which occupy almost exactly a quarter of the Park area, 474 km², generate sales turnover of £8.1m (only half of which is through sales of timber for felling) and GVA of £4.7m.

In addition, the forest provides a recreational environment for the enjoyment of residents and visitors alike through the provision (and maintenance) of amenities and facilities such as walking, hiking, cycle and mountain bike trails and paths, car parks, visitor centres for walkers, hill walkers, cyclists, mountain-bikers, day trippers and visitors staying on short or long breaks.

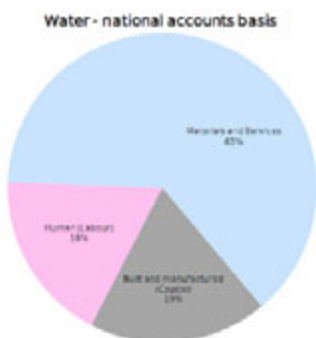
The presence of the trees is a major contributor to carbon sequestration, accounted under 'global services'.



Fish farming takes place in Loch Earn, Lake of Menteith, Loch Venachar and Loch Fyne. Together these represent value streams of over £4m and, with some £2.5m of purchases, a GVA of £1.5m. The Loch Fyne fishery, and the associated large **fish processing** factory and associated catering are on the Park's boundaries and an allocation of only part of their (substantial) activity has been made, leading to a further £1.4m sales and £0.5m GVA.

The **generation of electricity** is one of the important ecosystem services provided from the Park. Loch Sloy power station is by far the largest contributor to electricity generation. It is conservatively estimated it produces electricity value of £14m.

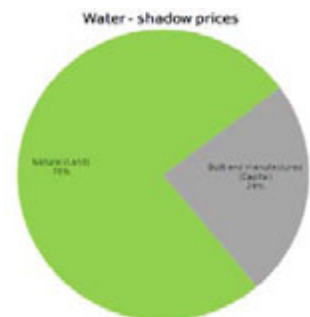
In addition, there also are a number of small scale hydroelectric schemes and the area represents perhaps a sixth of Scotland's potential in this area.



The **provision of drinking water** is a key service rendered by the Park's Loch Katrine and Glen Finglas and the Loch Lomond catchments. These supply fresh potable water to a third of Scotland. The annual water produced in the Park is valued at £202m and the 'ecosystem value' of the water produced from the Park is estimated at £142m per year.

However these figures are denoted as 'shadow prices' because they are very much higher than those in the national and regional accounts. The official accounts allocate national GVA essentially on the basis of employment, while water 'production' depends much more on natural assets and waterworks as are found in

the Park, than it does human resources, essential as the people are.



Tourism and Recreation

Table 0.2 The Production Account: Visitor Goods and Services

Resource/ Activity (value stream)	Natural (Land) (£m)	Built and manufactured (Capital) (£m)	Human (Labour) (£m)	Materials and services (£m)	Total (£m)	Of which market (£m)	Non- market (£m)
Visitor Goods and Services	£55.6	£43.4	£71.1	£35.9	£205.9	£153.4	£52.5
Defined Day Activities	£13.7	£4.0	£5.7	£2.8	£26.2	£12.5	£13.7
Undefined	£15.4	£0.8	£0.0	£0.0	£16.2	£0.0	£16.2
Accommodation & Hospitality	£22.6	£31.7	£45.2	£13.5	£113.0	£90.4	£22.6
Health Clubs etc	£0.4	£1.8	£4.6	£0.4	£7.1	£7.1	£0.0
Retail	£3.1	£3.0	£9.2	£15.3	£30.5	£30.5	£0.0
Other	£0.4	£2.2	£6.4	£3.9	£12.9	£12.9	£0.0

In total, there are **just under 7m visitor days in the Park each year**, with just over two thirds of these being a day out or a holiday, whilst the remaining third were scenic drives through the Park, en route to another destination. 91% of trips utilise a car to visit the National Park.

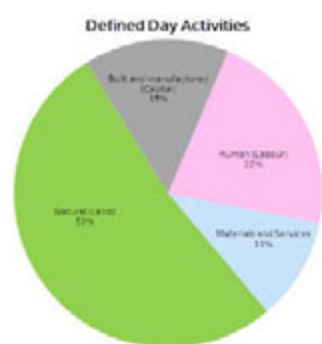
This figure is based on several different ways of estimating visitor numbers, reconciling records and estimates for various activities with the traffic flows around the Park and the seasonal pattern in that. Work on refining or ‘triangulating’ this estimate is continuing.

In total, Visitor Services produce just over £205m of value, and some 2,400 people are employed in Tourism and Recreation activities.

There are approximately 400 **accommodation** establishments, with a dominance of caravan and camping park beds. In total, around 715,000 people spend just over 2m nights in the Park, generating £43.1 - 72.9m of sales, the difference depending on the inclusion of other services offered by accommodation establishments, especially hotels, such as food and drink, spa, beauty and sports, etc. These people represent 1 out of every 9 visitors to the Park, and collectively undertake just under 30% of all activity days. Additionally, **hospitality-only** establishments are estimated to generate some £17.5m in sales.

The landscape is estimated to have contributed £22.6m towards accommodation and hospitality revenue, recognising the importance (and value) of ‘a room with a view’.

The accommodation sector, in particular the hotel sector which is particularly human capital intensive activity, employs almost half of the workforce involved in tourism and recreation activities.



In total, visitors spend c. **926,000 activity days carrying out lengthy activities** (that last over 3 hours).

The landscape was estimated to contribute just over half the total annual value of defined activities.

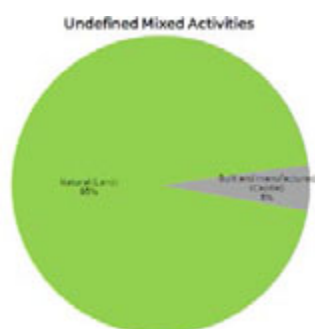
Hill walking is the most significant activity that takes place in the Park, representing some 426,000 activity days. The investment required to maintain and repair trails and salary costs is minimal (£350,000) compared to the benefits associated with the landscape and the activity itself. Indeed, we have estimated the value of hill walking at £4.0m.

We have estimated that some 15,000 activity days are spent on-road **cycling**, and a similar number off-road cycling. Whilst off-road cycling mostly takes place in the Park, on-road cyclists use roads both within and outwith the National Park area. After this is taken into account, calculations suggest a value of £132,600.

Approximately 49,000 activity days are spent playing **golf** in the eight golf clubs within the National Park. Revenue from sales was estimated at £11.2m. However, golf is a resource intensive sport, with costs amounting to £8.3m. The value was estimated at £16.2m.

A number of **water based activities** take place on the lochs of the LLTNP, both motorised and non-motorised. However, the most popular water based activity consists of tour cruises on Loch Lomond principally, as well as on Loch Katrine, supplied by three main operators. Overall, tour boats represent some 212,202 activity days. Motorised activities then represent the most popular type of water based activities, with motor-cruising and speed boating the most practised activities at 18,000 and 17,000 activity days each per annum whilst only 14,000 activity days in total are spent on the Lochs undertaking non-motorised water based activities.

Unsurprisingly, commercial activities attracted the biggest value at £2.5m, followed by motorised water based activities at £1.6m and finally non-motorised activities at £120,000, creating an overall value of £4.2m for water based activities.



Some 47,500 **fishing** activity days were identified, with only a minority consisting of sea angling. For an activity which incurs fairly low costs to run, the Value of fishing is estimated at £1.6m.

Finally, the vast majority of visitors that spent one day or more in the LLTNP undertake a range of activities that last fairly short amounts of time, but jointly occupy up to a whole day out, e.g. go for lunch, a walk and shopping. We have identified four different groups that together spend 4m activity days in the LLTNP, representing an overall value of £16.2m.

An estimated 400,000 people come to the Park each year primarily to enjoy **picnics** with their friends and families, in the many attractive locations that the Park offers, especially those along the water. The net economic value of the Park for picnickers' was established at £2.7m.

The largest group of visitors to the Park overall, with 2.7m people, are **typical visitors** who are attracted by facilities and amenities such as easy parking, short walks, and the opportunity to something to see, do and eat/drink something, such as Lomond Shores which welcomes over 1m people every year, whilst all other visitor attractions in the National Park area welcome similar numbers amongst themselves every year. Whilst the natural assets (the landscape, lochs, mountains, nature) may be of importance to some within this group, it is believed that for most, the fact that they are in a National Park is not a primary motivator - it is the array of 'things to do'. However, considering the sheer numbers within this group, they are valued at £9.1m.

Wildlife enthusiasts represent a minority in terms of numbers, as it is estimated to encompass 150,000 people who visit the LLTNP. These visitors have a particular interest in the flora and fauna of the Park, thus allocating high value to the Park's natural assets, valuing the Park at £1.0m.

The final group consists of **landscape enthusiasts**, i.e. tourists who are interested primarily in the scenery and the views obtained throughout the Park. We believe that there are around half a million day trippers/overnighters in this category, establishing a value of £3.3m.

Global Services

Table 0.3 The Production Account: Global Services

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non- market
Global Services	£113.4	£0.1	£0.6	£0.1	£114.2	£0.8	£113.4
Public Health	£95.4	£0.0	£0.1	£0.0	£95.5	£0.1	£95.4
Conservation	£10.6	£0.1	£0.5	£0.1	£11.3	£0.7	£10.6
Peat bog (carbon sequestration)	£2.4	£0.0	£0.0	£0.0	£2.4	£0.0	£2.4
Forestry (carbon sequestration)	£5.0	£0.0	£0.0	£0.0	£5.0	£0.0	£0.0

Statistical analysis of people's **health** within and in the areas adjacent to the National Park suggests that living in the Park causes a 7% fall in ill health. This dramatic result suggests very real substantial value in terms of health from the natural assets of the park.

There is extensive evidence that shows that exercise and recreation are, in general, good for the physical health of participants, and we have calculated that this has a value of just under £100m. This figure does not include the probably substantial positive effects of the National Park on mental health.

The Park boasts an area of some 327 sq km which is legally protected for conservation purposes such as the maintenance of endangered fauna and flora. The value generated by this conservation, based on the Willingness to Pay" to preserve equivalent areas, is estimated to be £11m.

The 213 sq km of blanket bog within the National Park acts as **carbon storage** facility. The growth in the volume of peat per annum was calculated to store the equivalent of an extra £2.4m worth of carbon per annum. Similarly, it is estimated that the forest/woodland located in the LLTNP captures an additional £5m worth of carbon every year, which rises by about £1m each year.

The value of the National Park as a generator of economic activity both within and on the edge of the Park was also investigated. The findings clearly show that economic activity is greater than might otherwise be expected and that there is a “halo” effect up to 10km of the Park boundary.

The problem, however, is that for the Park to have value at a Scottish level it must be shown that the economic activity has not been displaced from other areas, particularly from areas with significant unemployment. Whilst it would appear that the Park might be a saleable brand in the rest of the UK, the static nature of tourism in Scotland (and the decline in rural tourism) makes it difficult to argue that there has not been displacement. The result is that we are unable to conclude that the Park has a significant value in the economic development of Scotland.

Beneficiaries

This report not only attempted to explore the total value produced by the National Park, but also looks at who benefits or receives the value from the goods and services produced by the National Park. For example, It combines financial flows such as wages to local people, with non-market value flows, such as landscape to hill walkers. A number of assumptions were necessarily made to calculate the flows and are discussed in the full report.

Table 0.4 Recipients of Value Generated

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	External Customers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival and non-excludable goods
Export	£275.4	£2.2	£2.6	£138.6	£0.0	£37.6	£0.0	£94.4	£0.0
Visitor	£205.9	£78.8	£49.8	£44.3	£3.8	£29.9	£0.0	-£0.8	£0.0
Local	£270.5	£126.7	£22.3	£11.0	£0.0	£42.9	£0.0	£67.7	£0.0
Global	£114.2	£0.6	£0	£0	£0	£95.4	£18.0	£0.0	£0.0
Total	£866.0	£208.3	£74.7	£194.0	£3.8	£205.8	£18.0	£161.3	£0.0

Overall, the Scottish nation receives 24% of the value produced by the National Park, whilst External Customers benefit from 23% and Local Residents from 24% of total annual value.

Local residents receive 38% of their share of the value from the visitor goods and services (£78.7m), but the vast majority comes from local goods and services (£126.7m), the majority of which consisting of public and community services that do not go through the market.

The Scottish nation (including Park residents) and the global community are the main beneficiaries of the global services.

Export services mostly benefit external customers, which are the main recipients of the water, electricity, wood and food, with low proportion actually being used by local residents and visitors for their own consumption.

In conclusion

The headline figure of £866m for the value of the services the Park provides is akin to a ‘sales’ figure. To work out the ‘difference’ the National Park makes in economic terms we need to subtract the costs incurred to generate that value. If we take away the cost of materials and services bought-in to the Park we are left with Gross Value Added (GVA), equivalent to GDP but with many non-market services added in. If we also say that the labour cost in the Park’s production and the depreciation in the capital assets are also resource costs to society, and subtract that, we are left with Net Economic Value (NEV). One might say that this is the ‘profit’ that society makes from all the wonderful assets of the Park and the efforts of its workers. Clearly, this will be different for a local resident and for a non-Scottish member of the global community.

The mission of the LLTNPA is to enhance that figure.

Table 0.5 Value of the National Park

	Total Annual Value	GVA	NEV
Export	£275	£241	£208
Visitor	£206	£170	£92
Local	£271	£107	£45
Global Community	£114	£114	£108
Total	£866	£632	£452
of which within national accounts scope¹	£346	£266	£126
outside national accounts boundary	£520	£366	£326

Notes to Table 0.5:

1. In some cases the interests are cumulative. For example a local resident will normally benefit to a small degree from the value spread amongst the Scottish nation and the global community.
2. For comparison with more conventional analyses, and to show how far the researchers' 'beyond GDP' approach has progressed, the bottom two rows show how much of the Park's value would be revealed by the European System of Accounts, and how much lies outside this official statistical boundary.

Limitations

The study encountered a number of major challenges, some conceptual and some practical. Many of the practical ones relate to the absence of accurate data and the simple fact that the boundary of the Park fails to coincide with any administrative authority or data collection boundary. Importantly, there were no established estimates of visitor numbers so we had to develop our own based on vehicle movements into and out of the National Park. This is sensitive to difficult assumptions on the split in the winter months between "normal" traffic for activities like business, education, shopping and hospital trips, and visitor/leisure trips. Work is ongoing to triangulate this with top down estimates disaggregated from the Scottish Recreation Survey, the UK Tourism Survey and the International Passenger Survey.

Market transactions were estimated quite reliably from a Detailed Regional Economic Accounting Model consistent with ONS data, but figures for the non-market value to visitors of activities like walking and sightseeing were inevitably dependent upon quite small and sometimes dated studies of the "Willingness to Pay" of visitors or of the distances they have travelled to take part in the activity.

Despite the problems of data and, in some cases such as health benefits, admittedly tenuous modelling of the links between the facilities offered in the National Park and the health of the Scottish public, we believe that the results of the study provide important insights into the overall value of the Park, the composition of that value, the factors that produced that value (particularly the role of Natural Assets such as Lochs and Mountains) and how that value is distributed. We also hope that it provides clear guidance on the actions and resources needed to conserve and sustain the wonderful base of natural and other assets that constitutes the Loch Lomond and The Trossachs National Park.

¹ the market value of electricity produced in the Park has been included, because it is in principle within national accounts scope even though ONS regional allocation system does not allocate it to the Park. Similarly the value of water has been enhanced, because although the ONS regional allocation system does include something for water in the Park's GVA, it does not recognise the importance of capital assets in water production. In both cases in this row of this table we have only included what would be part of conventional national accounts, not any allowance for ecosystems values or controversial revaluations.

1 Project background and objectives

1.1 Loch Lomond and The Trossachs National Park: a brief overview

Loch Lomond and The Trossachs National Park (LLTNP) was established in July 2002, with the four statutory aims set out in the National Parks (Scotland) Act 2000. These are:

- to conserve and enhance the natural and cultural heritage of the area
- to promote the sustainable use of natural resources of the area
- to promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public,
- to promote sustainable economic and social development of the area's communities.

At the time the fourth aim was ground-breaking, in that Scottish National Parks were not only given a statutory duty towards conservation, sustainability and recreation - duties found in the constitutions of National Parks worldwide - but specifically an economic and social obligation in relation to local communities. Whilst all four of these aims must be pursued collectively, if conflict occurs between the conservation and enhancement of the natural and cultural heritage and other National Park aims, then conservation takes precedence.

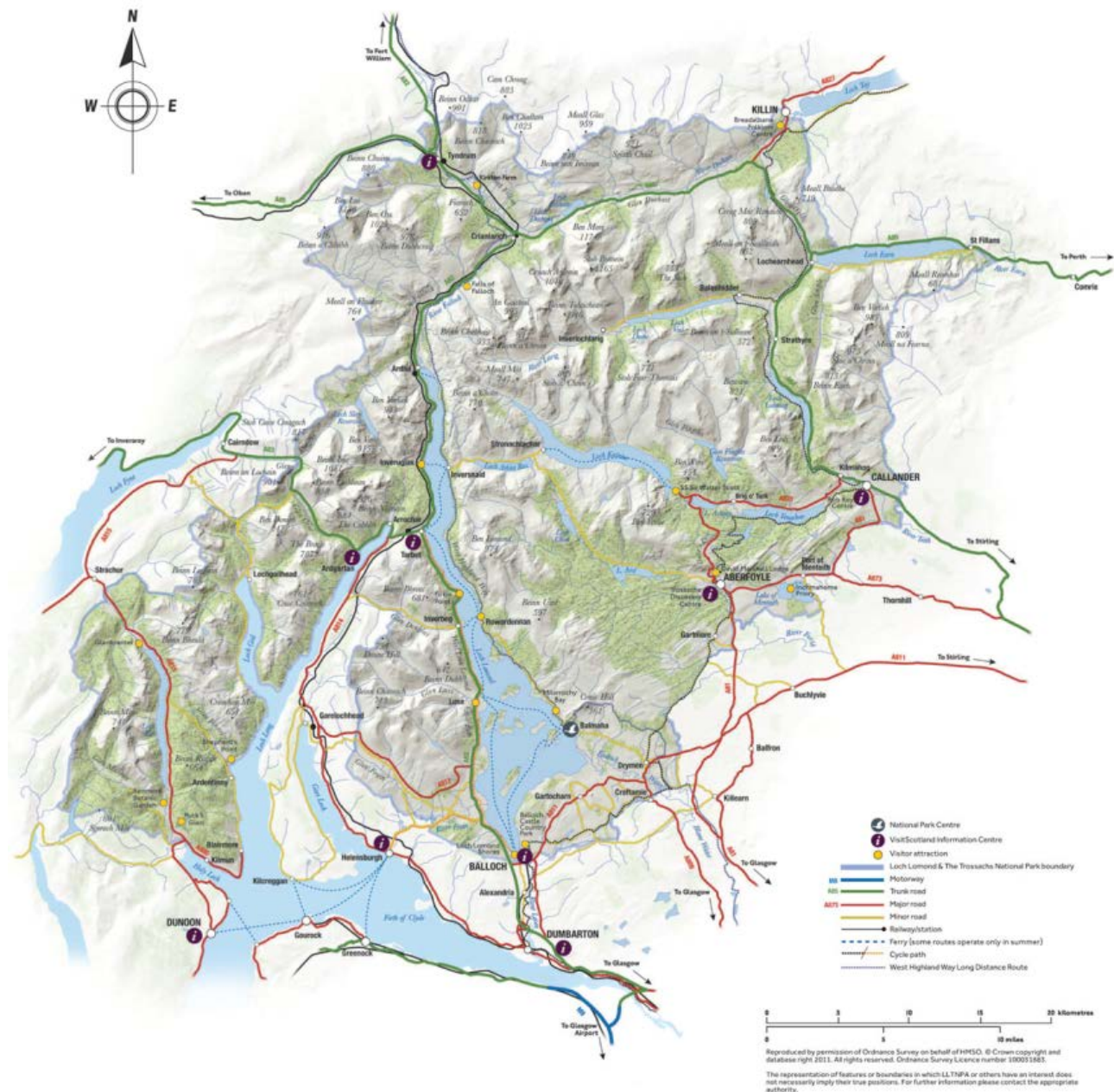
The National Park covers 1,865 square kilometres (720 square miles) and extends from the Holy Loch and the Cowal peninsula to St Fillans at the eastern end of Loch Earn, and from Balloch to Tyndrum.

The four main towns in the LLTNP are Balloch (part), Callander, Aberfoyle and Killin. In total, the National Park's communities comprise some 15,500 residents with about 1700 people working in the Park and living outside.

The National Park encompasses many lochs and rivers, native woodlands as well as working forests, and topography ranging from rolling lowland landscapes to highland Munros, affording spectacular scenic views. Its geology and ecology are of national and international interest and the object of many studies. As well as 'use' and appreciation by visitors, the natural resources of the Park are also used throughout the West of Scotland and beyond, in the form of water, energy, and building materials. Loch Lomond and the Trossachs are among the Scottish icons recognised worldwide.

The 'public' enjoying the Park in terms of the Act is very numerous. The National Park has a wide catchment area for daily visitors as it is easily accessible from the major centres of population in the central belt of Scotland. Day trippers can undertake a range of activities, from a leisurely stroll along the shores of Loch Lomond to more active pursuits such as hill walking, sailing or bird watching. Overnight and longer term visitors seeking understanding and enjoyment come from Scotland, many parts of the United Kingdom, and abroad.

Figure 1.1 Map of the LLTNP



1.2 Project objectives

In 2005, the National Park Authority (NPA) published the report *The State of the Park* (LLTNP 2005), which provided a comprehensive baseline of information about the Park, covering for example aspects such as land use, biodiversity and landscapes. Findings from this study informed the development of the first *National Park Plan 2007-2012* (LLTNP 2007), along with the trends and issues to consider for the National Park to achieve the four statutory aims.

The report included a conventional socio-economic profile of the communities residing in the National Park exploring the work residents do, the economy of the Park, aspects of the social structure and its relationship to surrounding settlements.

In late 2010 the National Park Authority commissioned an update of the socio-economic study with the following three objectives:

- To update the economic baseline data for the Park in order to clearly establish the current levels of economic activity within the National Park (NP) across the various sectors of the economy, whilst identifying any gaps in the data

- Based on the updated economic baseline analyse the information to provide a valuation of the contribution the NP makes to the Scottish economy and breakdown the key contributors to economic growth within the Park area.
- To recommend a longer-term methodology for regular monitoring of economic performance and progress.

However, the National Park Authority was not only interested in a conventional socio-economic study, but also in relating economic activities to the *raison d'être* of the Park by taking an ecosystems approach, thus going beyond the conventional boundaries. It was agreed that aspects such as landscape, recreation, health and wellbeing benefits should all be considered as far as was practicable.

1.3 A comprehensive regional economic account

Regional economic accounts conventionally cover all activities that have costs and sales, which in the context of the Park means industries such as agriculture, accommodation and catering, retailing and the provision of public services such as health care and education. The overall value of economic activity in market terms is represented by the level of sales. For services that do not pass through the market and so have no sales value as such - primarily public services and owner-occupied housing - then conventionally costs, or the values of a parallel service that does pass through the market, are taken to reflect the value of the activity. When the cost of input energy, materials and services are subtracted from this conventional overall value, we are left with Gross Value Added, which at national level is still sometimes known as GDP, Gross Domestic Product.

In this report we go 'beyond GDP'. To fulfil the LLTNPA's requirements we needed to develop a **Comprehensive Regional Economic Account** (CREA) that extends the accounting boundaries by including the value of non-market activities and, for consistency, values even market activities in a different way. Many of the non-market activities originate from the Park's ecosystems and so are designated ecosystems services. They include the value of regulating services (e.g. carbon storage), provisioning services (e.g. fresh water), recreation services (e.g. walking and cycling) and aesthetic services (e.g. landscape value).

As far as possible the CREA relates to national, European, and international conventions for economic and environmental accounts. It identifies the assets available, and the outputs and their value. It estimates the contribution to creating that value from the assets and other major factors of production. It displays the way that the value is distributed between groups of beneficiaries, and it attempts to measure in economic terms the long run sustainability of the Park's systems.

1.4 Use of the comprehensive regional economic account

A set of accounts is usually created to provide a summary of an activity over a defined period or a snapshot of an entity, such as an organisation or region, at a point in time. Whilst such accounts provide information on the relative size of the components, it should be emphasised that size is not, in itself, a guide for decision making. For example whilst walking might be ten times as valuable as water sport it should not be taken that development support should be in that ratio. Indeed the relative size may be the result of historic under-investment and the appropriate policy might be to invest ten times as much into water sport. However because much of the information in this report is new, or new in context, the juxtapositions may lead to reconsideration of priorities - for example the estimated effect of outdoor activity on public health may sometimes need to be weighed against aspects of conservation.

Perhaps the most important characteristic of standardised accounts, however, is the ability to compare over both time and space. In terms of the conventional accounts we have been able to undertake a limited examination of changes over time, but if this work is updated as suggested in Chapter 10, then it will be possible to establish if the welfare of the community (the value of the Park) is increasing, and that could be related to the cost of the National Park Authority. Equally if other National Parks in Scotland, the UK or elsewhere or, indeed, regional or local authorities produce Comprehensive Economic Accounts then the performance of each of these can be compared.

1.5 Limitations

Identifying values and building the comprehensive accounts required extensive data. Since devolution, market and social data on the Scottish economy has improved substantially, and since the Park's inception facilities and methods for extracting information relating to the National Park perhaps even more so. Nevertheless there remain some very large gaps in information on non-market activity. Many of the results we report reflect expert judgement on limited data and some aspects of the final comprehensive accounts are necessarily illustrative and indicative in nature rather than definitive.

Nevertheless we believe they constitute a worthwhile step forward in capturing and organising information on the value of the area and how that value is created and distributed. The next chapter presents the structure of the analysis, the concepts, and the methods by which estimates were made, with some examples.

2 Structure and concepts

2.1 Introduction

In this Chapter we discuss our approach to “Valuing the Park”, and the data sources and the methods used. The initial 2005 baseline report on the socio-economic structure was conventional in that it concentrated on quantifiable economic activity; the numbers of people working in each industry, levels of expenditure and incomes. The major problem facing that initial report was the poor availability of data for the area corresponding to the National Park, which had to be approximated on the basis of post codes and local authority wards.

The availability position has now improved considerably, so that with the appropriate estimation tools it is now possible to estimate conventional economic parameters (population, GVA, employment, incomes and expenditure) fairly straightforwardly. In this chapter we summarise some of the methods and tools used to do this for the National Park area. But whilst the first task of this report is to present an up-to-date estimate of this conventional data, the National Park Authority were clear that they also wished to systematically examine economic features that were potentially of considerable importance to the National Park but were not part of the conventional framework.

To do this we have to address the issues of how to estimate values which we cannot discover in the marketplace. We look at how to value those services that are not charged for (like enjoying the view or absorbing carbon dioxide), and how conventionally reported values may be distorted and, if so, how they can be corrected. ‘Distortions’ may arise from defining the scope of valuation, from measurement methods or conventions, or from the imperfections or failure of markets. All of these things may be present for a single activity - for example in water supply. We also discuss some of the principles of valuation, and seek to clarify some of the issues concerning value that can arise in public debate.

Our objective throughout has been to add up the value of the Park in a consistent way, and we realised in the middle of the estimation process that we could set up a structured framework to do this. It directly reflects the Park’s four objectives, while being fully consistent with national accounting standards and picking up some of the themes in the United Nations’ evolving System of Environmental and Economic Accounts (SEEA 2003 becoming SEEA 2012) as well as touching on the productive value of human capital and welfare measurement in terms of human wellbeing. We have used this framework to structure this report, so we begin Chapter 2 by outlining the framework itself (section 2.2), then consider some of the concepts of valuation (section 2.3). In Chapter 3, we outline the estimation methods for both the ‘conventional’ aspects and the extensions beyond them.

2.2 Accounting framework

The fundamental premise of the CREA accounting framework is that the Park is made up of a number of assets which, in combination, and with other inputs, produce value streams. Most of the value streams are received or absorbed by beneficiaries, but some of them are invested in maintaining or replacing the assets.

Assets, value streams and beneficiaries are the three dimensions of the framework, and each can be presented in as much or as little detail as required.

2.2.1 Three dimensions: assets, value streams, and beneficiaries

The Register of Assets presented in Chapter 4 identifies four main groups of assets, subdivided into two dozen categories. These are six categories of natural asset; six categories of built or manufactured asset (four of them infrastructure and two for private use); the people of the area categorised according to (multiple) population characteristics, casting them as productive human capital; and a further group of cultural and heritage assets, five concrete and one abstract.

The Catalogue of Value Streams identifies activities that yield valuable services. Although each is essentially defined in terms of process and product and so lends itself to an industrial classification, we have marshalled the different streams into four groups based broadly on who purchases or receives them: Export industries; Visitor services; Local services; and Global services.

The Beneficiaries themselves are described in terms of widening groups of people: local people; visitors; other purchasers; other identifiable people; the Scottish nation at large; the wider community up to the global level.

These three dimensions form the axes of the four accounts in the CREA accounting framework.

2.2.2 Account 1: the Production Account

The rows of the first account are value streams, and the columns are the assets, and thus it shows how the assets (and other inputs) contribute to each value stream. It directly addresses the second objective of the Park: *to promote the sustainable use of natural resources of the area*.

The production of goods and services requires resources in different amounts. The classical economists distinguished three sets of resources, or factors of production: land, labour and capital. Later land came to be regarded as a constant element in many analyses, and models of production were limited to capital (K) and labour (L). The Italian value theorist Sraffa, and Russian mathematician Leontief, amongst others, identified the importance of input goods and services and from their analysis the input-output model recognising intermediate products was born. A relatively recent development (Jorgensen, van Ark, Mahoney) is to study productivity using a so-called KLEMS structure (Capital, Labour, Energy, Materials and Services) and this has now become a lead approach in analysing a country's GVA.

What the CREA system does on the production side to extend the KLEMS model to incorporate both local natural resources (essentially the factor originally identified as land) and global resources such as climate. In 1935 Arthur Tansley coined the term ecosystem to describe the holistic and integrative ecological concept that combines living organisms and the physical environment into a system, but the value streams generated by such systems, ecosystems services, remain typically (but not always) outside the standard national accounting frameworks.

Table 2.1 Account 1: The Production Account (use of assets and other inputs to create/generate goods and services)

Resource/ Activity (value stream)	Global (Biosphere)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
Export								
Visitor								
Local								
Total								

To prepare the first Table of the system we first estimate the total of each value stream, using the DREAM® model to provide local and industrial detail for things that are covered by the national accounts and a variety of bottom-up techniques for those that are not. These are described in detail below. But Table 1 of CREA is primarily concerned with the way in which the inputs are combined to produce the goods or services, known as the 'technology' or production function, and so the total has to be divided up. In the Table 'responsibility' for a value stream's production is divided between the resources. Our estimate of the contribution of paid human resources, materials and services is primarily based on the incomes received as shown in the national/ regional accounts, disaggregated using the DREAM® model. The contribution of built and manufactured capital is harder to assess, partly because the estimation and regional allocation methods used for GVA by the Office for National Statistics leave something to be desired when it comes to capital-intensive industries. Most specifically, ONS focuses on employment, and has not provided any figures for regional investment for more than a decade. Our estimates are usually based on avoidable costs - for example the value of capital inputs to the hydro-energy value stream is commensurate with the cost of new renewable capacity. After allowing for other inputs the contribution of natural capital and the biosphere has normally to be estimated from the accounting process, often as a residual, but there are important exceptions where we understand the operation of the relevant ecosystem to some degree, such as carbon fixation.

Despite our best efforts to divide up the inputs in this way, we would caution that it is only an accounting convention: the nature of production systems, *and complex ecosystems in particular*, is that inputs are profoundly intertwined and cannot be separated, any more than we can arithmetically divide the responsibility for bringing a child into the world between the two parents.

Because of the level of detail and the methods of estimation we are also able to extract the conventionally-measured GVA (GDP) and gross output directly from this table. The table therefore shows, as well as the second objective, the principal production aspects relevant to the Park's fourth objective: *to promote sustainable economic and social development of the area's communities*.

2.2.3 Account 2: the Recipients account

The second table, Account 2 of CREA, shows how the value streams represent benefits for different communities and individuals. The rows are again the value streams but the columns show the widening circles of beneficiaries. The account thus directly addresses the third objective of the Park: *to promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public*. It allows for the fact that some of the benefits are non-rival (for example the fact that you enjoy a view does not limit my enjoyment of it) with a potential adjustment for double counting.

Table 2.2 Account 2: The beneficiary/absorption account (consumption of value streams to improve human welfare)

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	Other purchasers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non- rival and non- excludable goods
Export									
Visitor									
Local									
Global									
Total									

In business terms this table might be said to address the question: ‘What customers is the Park serving?’, with the definition of ‘customer’ set very broadly. It also addresses the consumption aspects of the Park’s fourth objective.

In this report the table is best described as primarily illustrative of the way the value flows are distributed to different groups. It combines financial flows such as wages to local people, with non-market value flows, such as landscape to hill walkers. The general assumptions are as follows:

1. Payments for labour are made to local residents.
2. Payments for materials and services are made to external suppliers.
3. In Export, Visitor and Local activities 17.5 per cent of the market flow goes out in taxes; specifically VAT. It is assumed that this sum will eventually be returned as part of the block grant to the Scottish government.
4. Market payments for capital are split 50:50 between local and external suppliers.
5. Value flow from agriculture and forestry (and the balance from any other Export Activities) is assumed to be local.
6. Non market Value flows for Visitors are assumed to be captured by Visitors, non market flows in local activities by local residents.
7. The dominant non-market flow in Export is from non market pricing of water and is assumed to flow to the Scottish Nation as a whole via reduced bills from Scottish Water. The exceptions are the carbon sequestration resulting from forestry and the carbon saving *premia* resulting from Hydro-electricity where the benefits are assumed to be Global in character.
8. Non market flows from Global focussed activities are split between Scotland (Public Health) and the world in general (Conservation and Carbon Sequestration)

As time progresses we would expect survey and other evidence to be available to make more accurate assessments of this distribution.

2.2.4 Account 3: The accumulation account

The third Account in CREA takes cognisance of those value streams which can improve the assets, or which diminish them directly. It takes the penultimate column of the previous Account and reclassifies it according to the assets affected. It thus helps us to get a fix on the sustainability of the Park. In the National Park much of the focus of the Authority is in ensuring that the natural resources are improved and maintained, and as was shown in the first account many of the key activities in the Park are dependent upon them. Table 3 thus addresses the first objective of the Park: *to conserve and enhance the natural and cultural heritage of the area*, which it will be remembered was ‘*the first amongst equals*’.

Table 2.3 Account 3: The Accumulation Account (use of goods and services to enhance - or diminish - assets)

Resource/Activity (value stream)	Global (Biosphere)	Natural Capital (Land)	Built and manufactured (Capital)	Human capital (Labour)	Total real assets	Financial assets	Assets outwith the Park
As previous tables							
Independent capital consumption							
Natural growth							
Revaluation							
TOTAL							

The Park is meeting its first objective if the totals, most particularly the first two totals, are positive.

Resource limitations mean we have made less progress than we would have liked in completing this account and the balance sheet but include them to illustrate how the complete system captures issues of sustainability and can highlight areas where the asset base is being seriously eroded. Again we would hope that, in time, progress can be made in these areas.

2.2.5 Account 4: The Balance Sheet

The fourth and final table shows how the annual streams of value represent changes to a 'balance sheet' capital sum that gives us an idea of the assets being stewarded, in terms broadly comparable with, say, the national debt. The assets are those identified in the Register of Assets.

Except for the built, manufactured and financial assets, which are normally based on replacement costs or market values, it is largely estimated through discounting future value streams. The results are obviously a very tentative, if not an heroic, estimate. The discount rates are a proper subject for the widest public discussion², and putting a capital value on a public natural asset is plainly a controversial matter. The Account may therefore suggest some interesting challenges for the communities engaged and, more directly for the Park Authority.

Table 2.4 Account 4: The Balance Sheet

	Global (Biosphere)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Total real assets	Financial assets
Opening balance						
Annual changes						
Closing balance						

2.3 Concepts of value

2.3.1 Value and willingness to pay

The aim of this project was originally expressed as to 'value' the Loch Lomond and The Trossachs National Park, and so the meaning of the term 'value' is central to the project mission.

In welfare economics value in the most basic sense is a measure of worth based on the utility derived from the consumption of a product or service. However this technical use does not accord fully with modern popular use and discussion, and with many common expressions of value in monetary terms. As Lord Darlington would have put it, economics distinguishes itself from cynicism by differentiating between price and value. Price is not a sufficient measure of value because it reflects market structures, ownership, and power.

As discussed earlier, as a practical matter in market situations we begin our estimate of total value with the expenditure that passes through the market, and then elaborate from this base in various ways. The need for elaboration, however, is shown most clearly when we consider assets, goods or services which do not enter markets. Examples of such non-market goods are visual landscapes, many physical recreation activities, or carbon fixation (at least hitherto, before the codification and establishment of carbon trading). Such things are plainly of value, even though they have no price, but if we can adduce values for them we must apply the same principles even to market goods.

However we may estimate it, the units in which value is measured in the CREA and in this report are monetary ones, and we need to be aware that this implies a large degree of substitutability between market and non-market goods and services.

² It would not, in our view, be appropriate, for example, to accept blithely the discount rates suggested in the UK Treasury Green Book to value assets which are quintessentially Scottish and which are a small but important part of global ecosystems.

2.3.2 Market Value and consumer surplus

Where transactions take place within a market then the standard accounting method of identifying total value is to add up the expenditure made by the purchasers, which is equal to the costs of production plus the profits enjoyed by the producer and vendor. This, however, is not a true estimate of the value the community places on the object of the transaction, but indicates the lower limit of the actual range. In reality most consumers (theoretically all except one) will have been willing to pay more for the good/service than they actually did. The difference between what a purchaser does pay and what s/he would have been willing to pay is known as the consumer surplus (CS). Thus if someone takes a boat trip at a price of £10 but would have paid £12, standard accounting records the value only as £10.

The team were not unaware of the advantages of using simply expenditure as the measure of value for market transactions. It is objectively measurable, often publicly reported, and by definition a figure that has been agreed upon by at least the two parties to each transaction. Given the difficulties of estimation and the advantages of using an open standard convention, for strictly commercial businesses such as accommodation and retail it would be very attractive if total value should be identified with expenditure. However the principle set out in paragraph 2.3.1, that we should treat paid-for services and those that are not paid for in as similar a way as possible, was reinforced by a very practical consideration. Standard accounts would allocate value to the conventionally-measured factors of production (capital and labour) that produce it. If value is equal to expenditure which is equal to costs (including 'normal' profits as a cost), then there would be no room for a contribution from natural resources. We would end up with a situation where for an activity like boat cruising, which is essentially motivated by the scenery and the environment, and so utterly dependent upon the natural resources, there is no 'spare' value which could be set against these resources. **Thus we have decided in all situations, market and non-market, to include estimates of consumer surplus in our estimates of value.**

2.3.3 The arithmetic, ethics and morals of value

In conventional economic accounting Gross Value Added is calculated by subtracting inputs of energy, materials and services from gross output, or total value as measured in conventional accounting. Estimating Net Value Added involves further subtracting capital consumption (close to the accounting concept of depreciation).

In welfare economics and cost-benefit analyses there is a similar concept known as Net Economic Value. To calculate this it would be normal to include consumer surplus (at least for non-market goods) but to subtract the labour inputs, because work is seen as a cost. This contrasts with the philosophy in most political and economic development circles, where the creation and financial support of jobs is seen as a good thing. The confusion arises because welfare economics is based on the satisfaction deriving from consumption, whereas *realpolitik* is concerned with the distribution of income, and most incomes derive from work.

All of these things have ethical and moral nuances, but by presenting the elements individually in the accounts, the CREA system is able to accommodate a range of ideological and practical approaches.

In Chapter 10 we identify:

Total Value = Expenditure (if applicable) plus consumer surplus

Value Added = Total Value minus cost of energy, materials and services used in production

Net Economic Value = Total Value minus all costs (where costs comprise energy, materials and services, labour, and the consumption of all forms of capital)

2.3.4 Boundaries in the analysis of value

Decisions on the LLTNP are devolved to the Scottish Parliament in Holyrood and consequently in this study the boundaries for analysis are defined as Scotland. Although some subsidy (or, in the case of energy, quasi subsidy via the renewables obligation) represents a flow of funds from outside this boundary, we assume that it is balanced by flows of funds from Scotland and our assessment of the net economic value is the difference between assessed costs and assessed benefits for each and all activities that occur within the Park.

Table 2.5 provides a list of the costs and benefits considered, with financial flows identified in bold type.

Table 2.5 Costs, benefits and financial flows

Operational Revenue	Operational Cost	Economic Value
Consumer Surplus	Environmental Costs	Financial Balance
Owner Surplus		
Employee Surplus		
Environmental Benefit		

Operational Revenue brings together all income streams (excluding subsidies). These may be large, as in Agriculture or Tourist Accommodation, or small as in guided hill walking.

The **Consumer Surplus** is the sum of money that individuals would be WTP over and above that which has been paid. In some activities such as kayaking or mountain-biking the activity is free and the consumer surplus could be quite substantial. The size of the consumer surplus is dependent upon both the number of consumers and the elasticity of the demand, which, in turn is dependent upon the nature and number of the substitutes. The assessment of WTP is discussed in the following Section.

The **Owner Surplus** is the benefit derived from the ownership of an asset. It is equivalent to the financial flow derived from the rent and is a benefit in kind. For example if the owner of fishing rights charges on average £2,000 per month but reserves 6 months of the year for himself, family and friends, then the owner benefit would be £24,000, of which the owner surplus is £12,000 and the revenue is £12,000.

The **Employee Surplus** attempts to capture the benefits of having a good job. Operational costs will include wages, as it is assumed that the employee could produce goods or services of equivalent value elsewhere (the opportunity cost). Where equivalent jobs are not available then there are two alternative approaches. The first is to utilise a shadow wage in the assessment, which could be only a fraction of the actual wages paid. This shadow wage will decline as the likelihood of unemployment reduces. An alternative, which is equal in value but has the advantage of separation of financial and imputed values, is to identify the value to the employee of the job. High value jobs or jobs in areas of high unemployment will have high employee surpluses.

Some activities have high **environmental benefits**. Public authority maintenance and waste disposal services, for example, generate no revenue but have substantial environmental benefits. Some activities, such as forest planting, will have substantial benefits in terms of carbon capture. Conversely forest harvesting has environmental costs with pollution from road haulage and negative short term effects on the landscape.

Operational cost simply records the financial costs of the operation including costs for maintaining capital items. If these are allowed to depreciate it would include imputed depreciation costs.

The financial balance is the difference between the revenues and the costs. In the case of negative balances (forest planting, hill farming) much of the difference may be met by subsidy. Taxation benefits should also be identified here if they are a key factor in the decision to continue or embark on “loss-making” enterprises.

The project sets out to identify the value of each industry/activity, the difference between aggregated benefits and aggregated costs both real and imputed. These are then summed to give an economic value of the National Park. In essence what we are trying to develop is a super-account for the National Park that reflects human values not simply market transactions.

2.3.5 How the Park may be valued by those who do not use it: existence value and intrinsic value

Whether or not they are bought and sold, the services discussed above are all directly used by someone - or some organisation - and it is the value those direct users put on the service that we were seeking to estimate. But the literature also distinguishes two further, less direct, categories of user value and two of non-user value:

In addition to the utility of a service, as discussed above, user values can be derived from:

- option value: the utility a consumer places on an asset in the chance that it might be used in the future. Genetic resources from scarce species are an example;
- bequest value: the value an individual places on an asset for possible future use by future generations.

Non-user values identified by some analysts are:

- existence value: the value placed on the continued existence of an asset even if the user or his descendants will have no perceived link with it. Normally existence values are placed on rare animals and species such as whales and pandas where contact is extremely unlikely but which people are willing to pay to preserve.
- intrinsic value: some analysts use this term to describe the role almost every natural asset has in a delicately balanced ecosystem somewhere. In our view placing values on assets without reference to human choice is fundamentally misleading. For example a tropical disease such as malaria may be an important element in the ecology of parts of sub-Saharan Africa. However in our view to suggest it has, as a result, its own value, is misleading, and in this particular case even potentially offensive.

2.3.6 Life and health as a major 'existence value'

One of the specific remits of the project was to value the role of the Park in public health. This has raised a number of conceptual and practical issues.

There is now extensive evidence that a lifestyle that involves outdoor activity, even if relatively limited, has substantial benefits in terms of general health and life expectancy. Those who participate in such activity are aware of these benefits. This means that it can be assumed the health value has been factored into any Willingness to Pay expressed by people who actually take part in an activity. Thus the user value of health is in the general calculus described above.

But it is also clear that while keeping people alive and healthy in general may have no specific use value to another individual, except in the context of family or other dependency, the entirely altruistic preservation of human life could be described as an existence value.

Valuations of life in the literature suggest that if the existence of the LLTNP induces enough activity from its visitors to produce an aggregate of one year of extra life then there is an additional value of £30,000 per annum.

We discuss the evidence and the principles in more detail in Chapter 9 and calculate a health value for the National Park. We also add some evidence about the existence value of the Natura sites in the LLTNP to give an overall view of the Value of the LLTNP.

2.3.7 The value of scenery/landscape

Landscape is an archetypal 'public good', delivering services to the public at large through the ecosystems of which it is a constituent part. It is known as a public good because these services cannot be delivered exclusively to individuals: everybody receives the value, and no-one's enjoyment need reduce someone else's. The absence of any sort of market valuation is a problem for policy formulation.

As an example, how do we compare the value from the output produced in large sheds used for intensive cattle rearing, and the employment and profits it remunerates, with the value of a conserved landscape? In practice society often sidesteps this problem by prohibitions or withholding permission within specified areas, such as National Parks or National Scenic Areas. This implies almost infinite value for a landscape, but such "absolute" solutions are continually under challenge, particularly in fringe areas and at times of economic distress.

For such proposals there are in addition four other factors that affect the value, one relating to people directly involved in activities which may alter the scenery, and three factors relating to the general public:

- If the loss in employment and income from scenery-affecting activity cannot be replaced with other activities then there is a loss to those employees³, and the entrepreneurs identifying the opportunity.
- The public put value on the health and local species survival of fauna and flora found in the National Park. For example, the public is willing to pay to maintain the Capercaillie in the area and if it were shown that jet-skiing threatens its long term survival then this detracts from the value of the jet-skiing activity.
- The public are willing to pay for improvements in health and life expectancy of the population, as outlined above. If, say, jet-skiing represented a danger to the general public then this would need to be included.
- Finally, the public is willing to pay for the long term health of the entire planet. In the case of jet skis then in principle taxation reflects the environmental cost of fuel, but if it did not then it would also need to be included.

2.3.8 Valuing volunteers

The purpose of this project is to value the assets of the National Park. These assets only have value because of the activities undertaken within the National Park, be it running a local shop or walking up a hill. The value released by the activities can then be related back to the assets.

The value of an activity will consist of a mix where the participants pay for the benefits they receive and where these benefits are free (the consumer surplus). However there are a number of situations where the activity benefits others. Examples of such activities are given in the table below.

³ Theoretically the charges against labour should reflect the opportunity cost of that labour. If the alternative to employment maintaining jet skis is unemployment then the opportunity cost is the value of leisure time, about one third of the wage rate.

Table 2.6 Example of volunteering activities and organisations involved

Role	Typical Organisations
Building Work	LLTNP, National Trust for Scotland, Mountain Bothies Association
Flora and Fauna Conservation	LLTNP, National Trust for Scotland, Forestry Commission, Scottish Natural Heritage
Education	LLTNP, National Trust for Scotland
Youth Leadership	Scouts, Guides, Boys Brigade, Cadets, Canoe Clubs, Sailing Clubs (School Clubs)
Care	Carer Centres, Relations, Clubs
Communities	Community Councils, Community Development Trusts

We assume that the volunteer receives a benefit at least equal to the costs of their time and physical effort. In some cases these may be mitigated by the community by providing free transport, food, training etc via grants to organising bodies.

For the purposes of this project we identify three types of volunteering

1. Where the volunteer also takes part in the activity and the activity occurs within the National Park.
2. Where the volunteer provides a service (principally care) to someone within the National Park that is formally unrecognised.
3. Where the volunteer provides a service that in addition to benefits within the National Park has benefits outside.

In the first case we first assume any surplus accruing to the volunteer is commensurate with the surplus associated with participants e.g. the youth leader running a hill walk will have personal benefit similar to those led. The member of the Mountain Bothies Association on a work party will receive benefits similar to that received when using bothies on an outdoor expedition. The additional benefits to others from the volunteering may be viewed as a transfer and will be counted in an expanded consumer surplus for the activity. For example work undertaken by volunteers to maintain hill paths or clean islands enhances the experience for others and leads to both expanded surplus per individual and more individuals. The result is that in many cases the calculation of consumer surplus will incorporate the value of volunteering.

In the second case it is undoubtedly true that calculation of the value of activities in the National Park should incorporate some estimate of the value of unpaid service work. This project however, is primarily concerned with natural rather than human assets and rather than embark on a speculative, albeit extremely important, assessment on the broader value of volunteering it has been decided simply to note the omission.

The third case is conceptually particularly difficult to deal with and is primarily concerned with the benefits of conservation. When assessing the value of conservation it has become very clear that non-user existence value of the rare flora and fauna dominates the assessment. Thus the vast majority of the benefit voluntary work undertaken in, for example, a National Nature Reserve (NNR) is received by the public at large outside the National Park. A few visitors might receive benefit from observing a rare bird or ancient oak woodland but the majority flows to the public who are happy to simply know of its existence. In these cases we add a speculative additional value to the voluntary work to reflect this additional benefit.

2.4 Decisions based on value: distinguishing the concepts

economic activity and GVA, economic impact and net economic value

Most economists find it essential to distinguish between the underlying level of economic activity, the impact of something on that level, and the more abstract net 'value' of the activity to society. Amongst laymen and in general commentary there is often confusion between measures of these three different things: activity, impact and value. It is not unusual for an industry responsible for output of £Xm to be incorrectly described as having an impact of £Xm. Equally the same industry might be described, again quite incorrectly, as having a value of £Xm. The distinction between economic activity, impact and value is central to this study and we briefly explain here that distinction and its role in decision making.

Total economic activity and value

Economic activity is normally recorded through adding up the transactions that occur within an economy to estimate gross output and, as we have seen above, subtracting purchases to estimate gross value added, which is divided between employment income and operating margins. The aggregation of value added in a region is the "product" of that region. There is no data for the National Park but we have estimated economic activity by breaking down regional data using the DREAM® model with national and regional accounts from ONS and the Scottish Government, and the Business Register Employment Survey. However we have found that some of the regional allocation methods used at ONS, because of their reliance on employment data, do not reflect GVA in conventional national accounting terms.

Our interest in the Park, even our economic interest, is not restricted to its role as a place to do business and work. This study is also concerned with the value of the Park with respect to activities like car touring or kayaking and in maintaining or improving the special environments and public health. We seek to place a total economic value on things, such as mountains, many of which cannot be changed.

At this point it is important to recognise that the usefulness of total economic value in decision making is very limited below the most strategic levels. Total or average values should not normally be used as proxy values for marginal effects. For example a decision on the expansion of the ranger service to promote hill walking might require evaluation of expected consumer surplus and an estimate of the ADDITIONAL public health benefit. This may well be of a totally different order of magnitude from the total benefit of the existing ranger service.

A consequent question might be "why bother to calculate total values at all?" One answer is that without some idea of the magnitude of the value of an asset, it may be overlooked in the calculation of marginal effects. For example we consider that the peat moorland has an important value as a carbon sink. In some places carbon saving technologies such as wind farms were promoted in moorland areas. However if not associated with peat extraction or the cessation of peat growth, the overall benefit might be significantly over-estimated.

Economic impact

Economic Impact studies attempt to identify what might happen as a result of a specific decision. For example suppose a decision is made to ban jet skis in the National Park - this will have a series of consequences:

- on the negative side the local economy will lose certain visitors (the skiers) and their expenditure, both general and specifically related to jet skis (local servicing, wet suits etc);
- on the positive side the improvement in the experience for non-jet skiers (specifically the aural experience) may increase visitor numbers and their expenditure

The difference between the two provides a forecast of changes in expenditure, output, value added, income and employment that might be expected. Those changes may be multiplied through supply chains, and lead to other consequences that can be modelled. However these 'impact' sums do not tell us the "Value" of jet-skiing to the region.

Net economic value

Economic value analysis is concerned with the costs and benefits of activities to society as a whole. In the jet-ski example, the participants receive excitement and pleasure from this high adrenaline sport. These benefits (the utility) are important to them and are the reason that they are willing to pay to do jet-skiing. The Benefits however have to be put against the Costs of the activity (fuel, maintenance, depreciation & insurance, berthing and possibly bank damage) and the difference is the net economic value of jet-skiing to them. If jet-skiing were banned the participant may either leave the area or carry out another activity in the area. In both cases, however, the choices s/he actually makes show that the net economic value of any alternative to the skier is lower than the value of jet-skiing itself.

However there are costs and benefits to others, such as other loch users who enjoy the scenery and environment. The jet-skiing activity may be a cost to some because of the noise effects, but a benefit to others because of the visual stimulation. If jet-skiing were banned the value of the experience to current users would change. Some might not come without skiers to watch, but others might be attracted because of the improved aural environment. In welfare economics the overall cost benefit of a ban would be calculated by adding any increase in value to this group and any loss of value to the jet skiers. Whether a ban should be imposed would depend on whether this was positive or negative.

In examining the National Park it will usually be the intention to ensure that there is an appropriate balance between the interests of the users, the general public and the suppliers of goods and services in the National Park area. We believe this can best be achieved by broadly exploring the economic value of the assets that form the National Park and changes to the services they provide. In practice and in realpolitik a decision might quite properly be influenced both by net economic value and economic impact calculations.

2.5 Conclusion

In this chapter a new accounting system has been proposed that incorporates both market and non market values and provides a means of identifying the value of ecosystems. It is compatible with international accounting conventions and produces outputs that match the objectives of the National Park. Inevitably when dealing with trying to measure an abstract concept like “Value” there is a strong possibility of confusion. In this chapter we have sought to explain what exactly economists mean by the term and relate that to terms like economic impact, cost-benefit analysis or gross value added. We have shown how these relate. In the next chapter we discuss data sources and data estimation.

3 Data methods

Much of the work in preparing this report was work of data assembly, dissection, and reassembly. Official information on conventional variables is not provided in significant detail to anything like the appropriate geographic level, or comprehensively and consistently to anything like the appropriate activity level. For non-market activities (other than public services and owner-occupation) the availability of information both on outputs (levels of service) and on values per unit of those services is either very limited, or can be adduced only as best guesses or from parallels elsewhere. The key data gaps are discussed in the final section of this report. In our view however, even if reliant on expert opinion, the exercise still provides enough useable information on orders of magnitude to provide guidance on priorities and is, in any case, an essential first step.

3.1 Geographic units

Different social and economic data is collected and estimated by different methods and presented in geographic units of different size, depending upon the volume of the data and how it is prepared.

The national Census is the most comprehensive data set and unsurprisingly offers data in the smallest of geographic units, the Census Output Area (OA). The number of households in an OA is around 50 with populations typically between 100 and 150. But even the largest surveys other than the Census cannot present accurate data at this level and increasingly socio-economic data is presented in units consisting of approximately five Output Areas known as Scottish Data Zones (DZ).

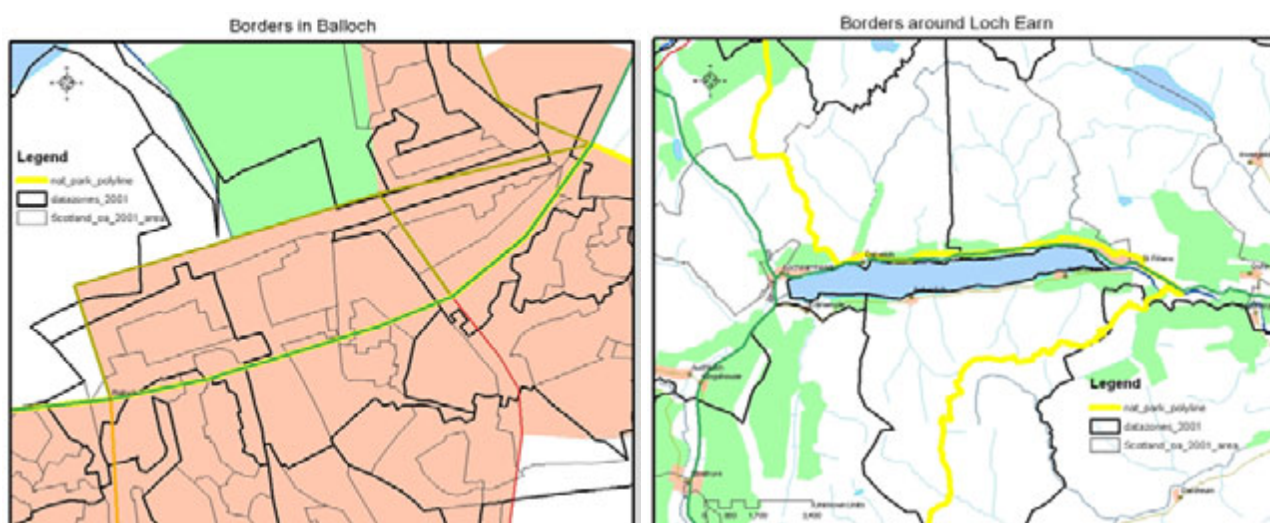
The introduction of data zones has meant some data loss, but significant data gain. Whilst some data that used to be available at OA level is now only available at DZ level, more importantly employment and health data that used to be presented at larger ward or health authority level is now available at DZ level. This important advance, which occurred while this project was in progress, is matched by the development of an easily accessible data base for much of it, Scottish Neighbourhood Statistics. The important implication for the Park Authority when constructing relevant data series is now discussed.

3.2 Park boundaries and data geography

Even with new finer-resolution statistical geographies, there are difficult issues drawing out figures that fit the Park. Originally the National Park area was based on the two forest parks, Argyll Forest Park to the west and Queen Elizabeth Forest Park to the east, and on the defined national Scenic Areas. The associated watersheds became, in most places, the boundary of the Park. The exceptions related either to Ministry of Defence (MOD) land around their bases at Faslane, Coulport and Glen Douglas, or to a desire to keep a natural feature wholly within the Park (Loch Earn).

What is clear is that there was no attempt to link the National Park boundary to administrative boundaries or to statistical boundaries, even at output area level. Figure 3.1 shows the extraordinary challenges arising in areas like Balloch and Loch Earn (St Fillans).

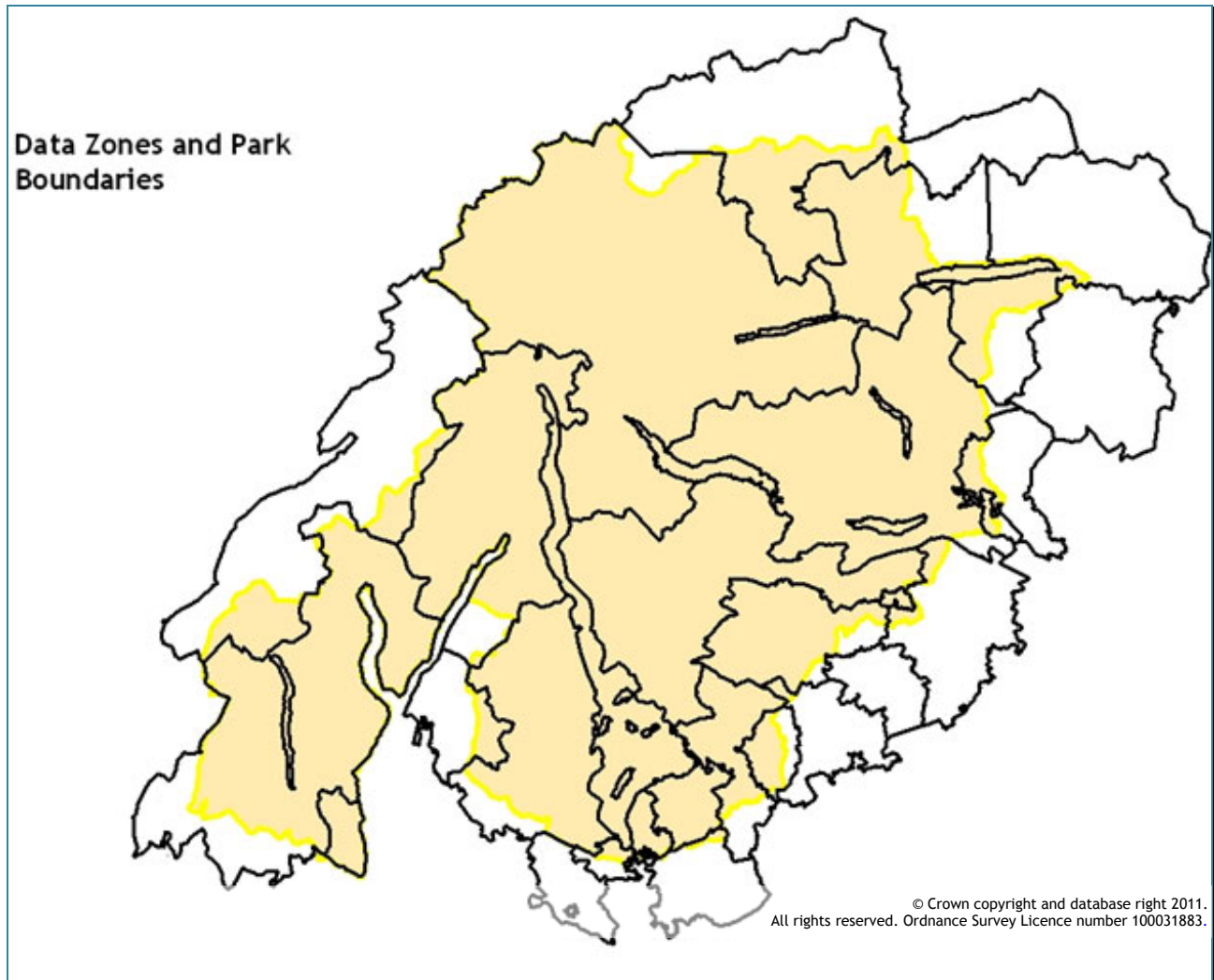
Figure 3.1 Data zones and borders in Balloch and around Loch Earn



These challenges mean that, after taking in estimates from official and other systems, every statistic for the National Park has to be further “estimated”. For example, to estimate population, the NPA sub-divided output areas by counting households each side of the boundary. We applied this same split to all OA statistics and, by aggregation, to all DZ based statistics. Further ad hoc adjustments were sometimes appropriate particularly in data zones that crossed the Park boundary.

Figure 3.2 shows the boundaries of the data zones and those of the National Park. The yellow line identifies the boundaries of the National Park and the black line the data zones that are either wholly in the Park or have to be partitioned.

Figure 3.2 Data zones and National Park boundaries



3.3 A tool to deal with Data Zones and partitions

With the data zone system, once the proportion of each zone that is to be attributed to the National Park has been estimated, then procedures for identifying any statistic for the Park becomes remarkably straightforward. We developed a simple spreadsheet tool to put them into practice.

A “converter” matrix was created that showed the proportion of each data zone in Scotland that was to go into the specific statistic. For example if we are interested in Perthshire as a whole, all data zones in Perthshire have a value 1, and the other data zones in Scotland a value of zero. The matrix is shown in Figure 3.3.

3.4 Estimating market and near-market activity

A considerable amount of modelling work has been done to estimate the sales and output of businesses in the Park, and to put a proper value on non-market goods and services. Where these come within the so-called 'production boundary' of the United Nations' System of National Accounts then this modelling has mainly been within the context of the Detailed Regional Economic Accounting Model (DREAM®).

As we have said, detailed economic data on activities is only available for Great Britain, and that is not consistent with national accounting standards. The lowest geographic level at which any consistent economic statistics are officially available is for the territories the EU calls 'NUTS3', which often comprise more than one council area, sometimes with part areas. Even here we can obtain only gross value added for six broad industrial groups: The closest figures to the National Park are outlined in the following table. It can be seen that each part of the Park is not only lost in the contributing local authority, but two of those local authorities are combined, and the others are mixed and matched with all or part of other authorities that have nothing to do with the Park.

Table 3.1 Best available national statistics on local GVA

Gross Value Added (ONS data) 2008			
	Perth & Kinross, Stirling	Lochaber, Skye & Lochalsh, Arran & Cumbrae, Argyll & Bute	East Dunbartonshire, West Dunbartonshire, Helensburgh & Lomond
Agriculture, forestry and fishing	92	85	11
Production	670	188	392
Construction	373	108	172
Distribution, transport and communication	957	429	500
Business services and finance	1079	205	678
Public administration, education, health and other services	1106	415	1062
Total GVA	4277	1430	2816

Source: ONS Regional Accounts NUTS3

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Gross Value Added to NUTS3 level is estimated for 729 industries by an iterative process constraining initial estimates to ONS regional accounts as published for NUTS1, NUTS2 and NUTS3 levels, and using the Business Register Employment Survey at the 5-digit SIC level, the Annual Business Survey (ABS) at region by division level and the National Accounts (supply and use tables, SUTS). Additional data is brought to bear in Scotland, Northern Ireland and the Republic of Ireland⁴. Figure 3.4 shows the method.

A similar procedure is followed for compensation of employees, also making use of local data from the Annual Survey of Hours and Earnings.

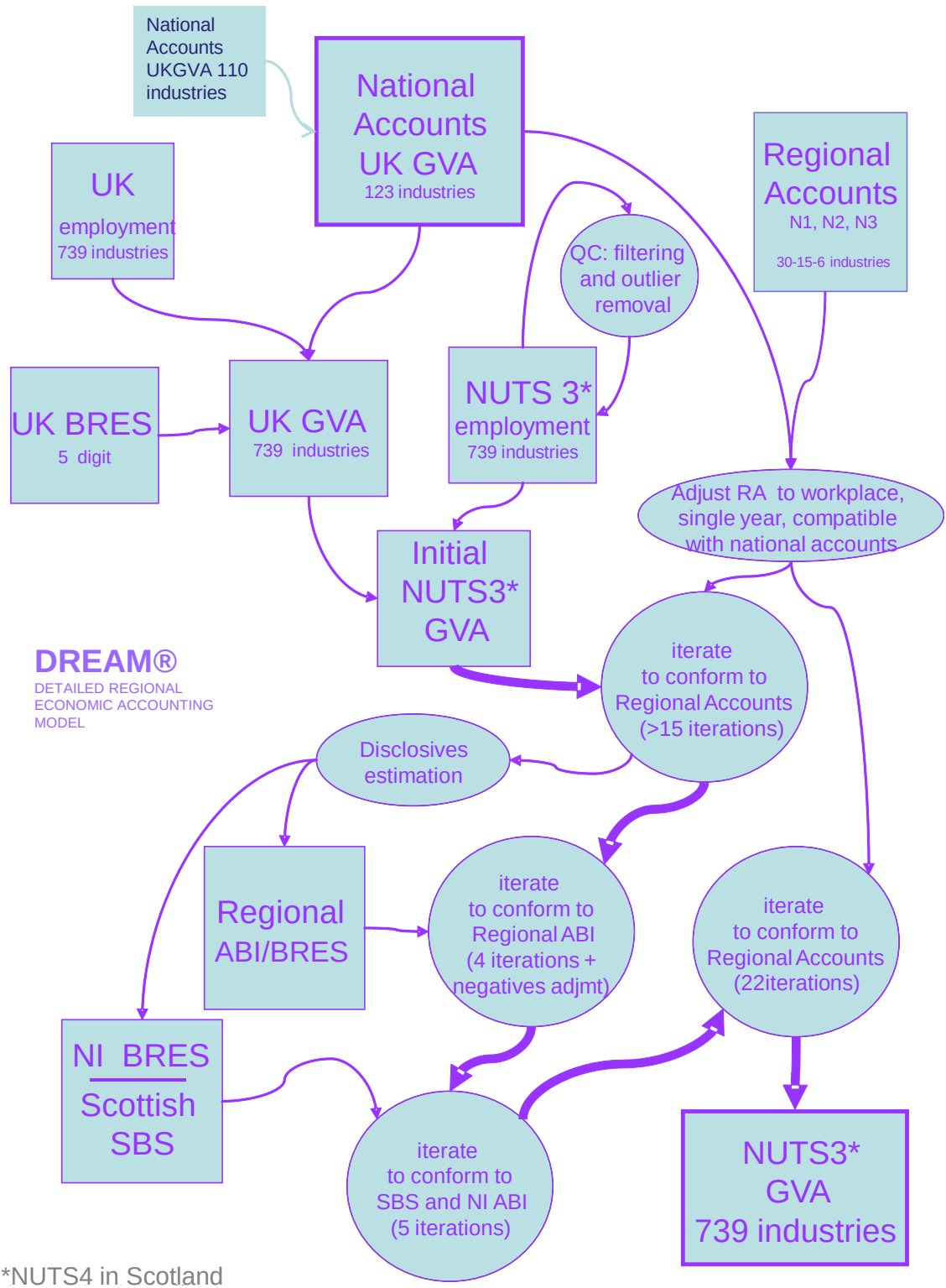
Gross Output (sales turnover) and detailed purchases are estimated using the GVA estimates together with the Annual Business Survey and the national accounts supply and use tables. Various extensions to and disaggregations of the national accounts are modelled to assist in this, for example distribution margins by product are split by distribution industry and by origin, and a complete 123-industry make matrix is estimated based on the limited non-disclosive information which ONS can make available. This is used to convert estimates of industry outputs to estimates of output classified by product.

The final estimates are constrained to the national accounts, SUTS. This is done even though the regional accounts may not exactly match due to data timing issues, and BRES and ABS are frequently significantly different. The differences arise because the BRES is only one early source for national accounting data, it does not have complete coverage, and the later balancing and adjustment stages take into consideration many other sources. This is especially important in the hospitality industries where national accounts estimates of GVA are about £7 billion higher than BRES estimates and much of the additional GVA is considered to arise from the compensation of the employees in kind and self-employment incomes.

At the time the study was carried out geographic statistical systems at ONS regional accounts and the National Online Manpower Information system were out of kilter, in that one used the NUTS system while the other used local authorities. Some hybrid estimation therefore required to be done. By June 2011 it should be possible to use both on both systems.

⁴ For Northern Ireland the Census of Employment replaces ABI1, interpolated between census years by the Northern Ireland Labour Force Survey. The Northern Ireland Annual Business Inquiry, the Manufacturing Sales and Exports Survey and the Business Insurance Survey are also used. For Scotland use is made of the Scottish Input Output Tables and Scottish Annual Business Statistics down to Local Authority level. Republic of Ireland estimates are based on the Republic's input output tables and national accounts, and are disaggregated only to NUTS2.

Figure 3.4 Deriving local GVA



3.5 Estimating values outwith conventional accounts

3.5.1 Methods of Valuation

As discussed in the introduction we have defined the value of any activity or situation as the amount the public are willing to pay for it, whether there is a charge or not. If the people in an area are willing to pay £5 million to maintain a local park then this represents the Value to them of that park. If the cost of running, maintaining and developing the park exceeds £5 million, then theory would suggest that the local park should eventually close. If the cost is less than £5 million, then there is a Consumer Surplus and the local park will remain open. At the national level, if the Scottish people are willing to pay £100 million (£20 per head) for a National Park then the Value of the National Park is at least £100m.

However problems arise because:

- a) The Willingness to Pay expressed is normally dependent upon the income and other resources available to the user. It may be considered appropriate in a commercial situation that a person's impact on decisions depends on their income, but for a hypothetical valuation to guide social choices there is no clear reason why a poor person should have less influence than a rich one. A further complication is that if it is believed that community resources have to be reduced then the willingness to pay for a park will also fall. Thus the value of a community resource is to an extent dependent upon the level of community resources.
- b) The Willingness to Pay is dependent upon the information base available to the user. If the community is unaware of what an organisation does then decisions will be based largely on emotion. For example few people really understand what the National Park Authority does, or even what the National Park is.

There are a number of sources for information about willingness to pay, of varying degrees of direct relevance. For example, obtaining a value for different types of landscape has been a major concern of environmental economists for over three decades. Moran (2005) produced a comprehensive study of both the methods and their practical application. The summary table from Moran in Appendix 1 shows a huge range of values for a huge range of situations measured in different ways in different currencies at different times, and was sponsored by the Scottish Government Environment and Rural Affairs Department. We first applied this to scenery.

A. Stated value approaches

Our first objective was to bring various estimates of willingness to pay to a common unit corresponding to the units adopted for this study; activity days. Because the original studies relate to different sub-groups in different situations with unknown means, to progress reasonable assumptions had to be made. In this context households were assumed to consist of 3.6 individuals⁵ and the number of visit in a year set at 4. 2010 prices were used. Applying these constants we obtain a mean value of £6.788 but with a standard deviation of 9.2. The scenery value is thus around 10 per cent of the daily cost.

By far the simplest approach to obtaining a value is known as the Contingent Valuation Method (CVM). This involves seeking from a representative sample of the public their willingness to pay for the good or service. An obvious example might be the willingness to pay for entry to a museum that is currently free to the public. The two key problems are 1) constructing the sample and 2) devising appropriate questions that both reflect the problem and are meaningful (and believable) to the public. Asking random members of the public how much they would pay for the scenery would fail on both counts. In practice the questions tend to be of the form "how much would you be willing to pay to ensure the continuation of a service (e.g. cutting back trees, preventing the erection of fences etc.) that enables views of the scenery".

For angling the question posed to a sample of anglers was the extra sums they would be willing to provide to a fund to ensure a river was kept clear of a highly destructive parasite.

For comparison Riddington et al (2008) looked at the impact of scenery on the price of a hotel room. A room price looking out on a car park cost on average £40.96. A 'Good View' added £20.45 to this price. Wind farms within the view reduced that by £7.41 whilst electricity grid lines had a £10.76 negative impact. Assuming 2 persons to a room, a scenery value per activity day for tourists of £6.80 seems reasonable, although the range around that value will be very large. Specifically we can imagine that the importance of scenery to an elderly coach or boat tourist might be significantly higher (by an unknown factor possibly as much as 100) than to a group of teenagers on their way to windsurfing on the West Coast, or a business person passing through.

In a second approach users are required to choose between bundles of goods and services which may include different levels of payment or compensation. Such stated preference (or choice) experiments have been extremely useful in identifying items like the value of removing over-crowding on trains. No examples can be found of scenery as part of a package.

The most common stated value approach to scenery has been based on the use of "mock-ups" illustrating a range of before and after views of a development such as a building, wind farm or grid line. The way in which the values are quantified is known as the Hedonic approach. The respondent is required to state how much they would be willing to

⁵ In fact average household size in Scotland is only about half this level, but the figure is consonant with assumptions made in the original research.

pay to prevent the development (or the compensation required to accept the development shown). By comparing answers for mock ups with different characteristics, the analyst can identify the value of each characteristic.

A further method is to ask valuation experts to identify the difference in the value of a property with/without the development.

Direct application of such studies to the services that landscapes provide to visitors in the Park is however problematic. Partly this is because the original studies were usually carried out elsewhere, so there is a problem of benefits transfer: Every area is unique, and areas of natural beauty may be outstandingly individual. Another major problem is to identify what is actually being valued in the mind of the respondent. For example a typical value from a visitor for preserving landscape in a National Park might be £50 per annum. But potentially that value is for three services; a) as a User of the scenery (aesthetic pleasure) b) as a User of the land or water for recreation c) as a non-user who places a value on the existence of flora and fauna conserved in the National Park. As Moran points out, regularly planted conifer forest is not popular aesthetically but many find it excellent for recreation purposes and it may be a very good habitat for a rare bird such as a Capercaillie, which many people would value.

Stated value approaches have been criticised as they involve no actual commitment on the part of the respondent.

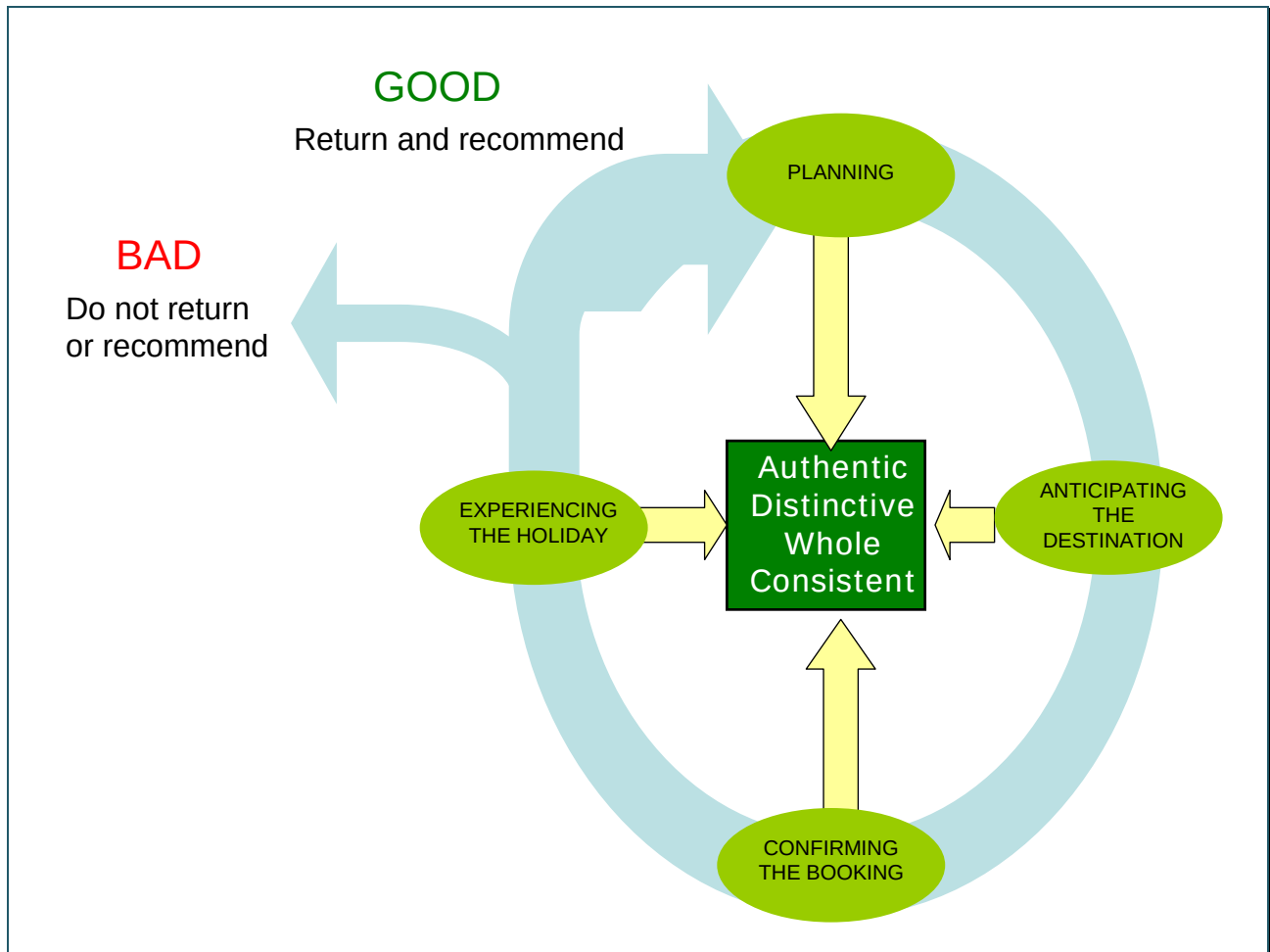
B. *Revealed value approaches*

Revealed Value approaches seek statistically to examine the visitor behaviour found in practice.

One particularly useful method from a valuation viewpoint utilises a Hedonic Pricing Model. This model relates the price of a good or service to its characteristics. For example we may develop a database of house prices related to their characteristics such as number of bedrooms, garden size, proximity to traffic and quality of view. Regression analysis provides a systematic valuation of each of the characteristics. Whilst theoretically possible, the imprecision of grading scenery limit the value of this approach for valuing scenery.

In some cases we are interested in understanding the impact of characteristics on the number of users or sales for a good or service. For example what is the impact of the distance of a ski centre from the centres of population relative to the quality of the skiing (length, difficulty and number of runs) and the ticket price. Each individual will be facing a specific, possibly unique, set of characteristics and makes a choice of one of the centres based on this set. The specification of the regression model can be complex and must take account of the range of values the dependent variable can take (from a dichotomy: either chooses or does not choose to visit, to a selection from a range of destinations) and the way an individual chooses. Quantitative analysts often simplify this into a simple process, where typically an individual selects by initially considering broad groups and then refining down. Sometimes choices are described as irrational simply because they appear to contradict this very basic model, but this is because the choice process modelled is simplistic. For many visitors to the Park the decision will be a repeated one, in which case something like the following model (which we have used elsewhere for overnight visits) may apply:

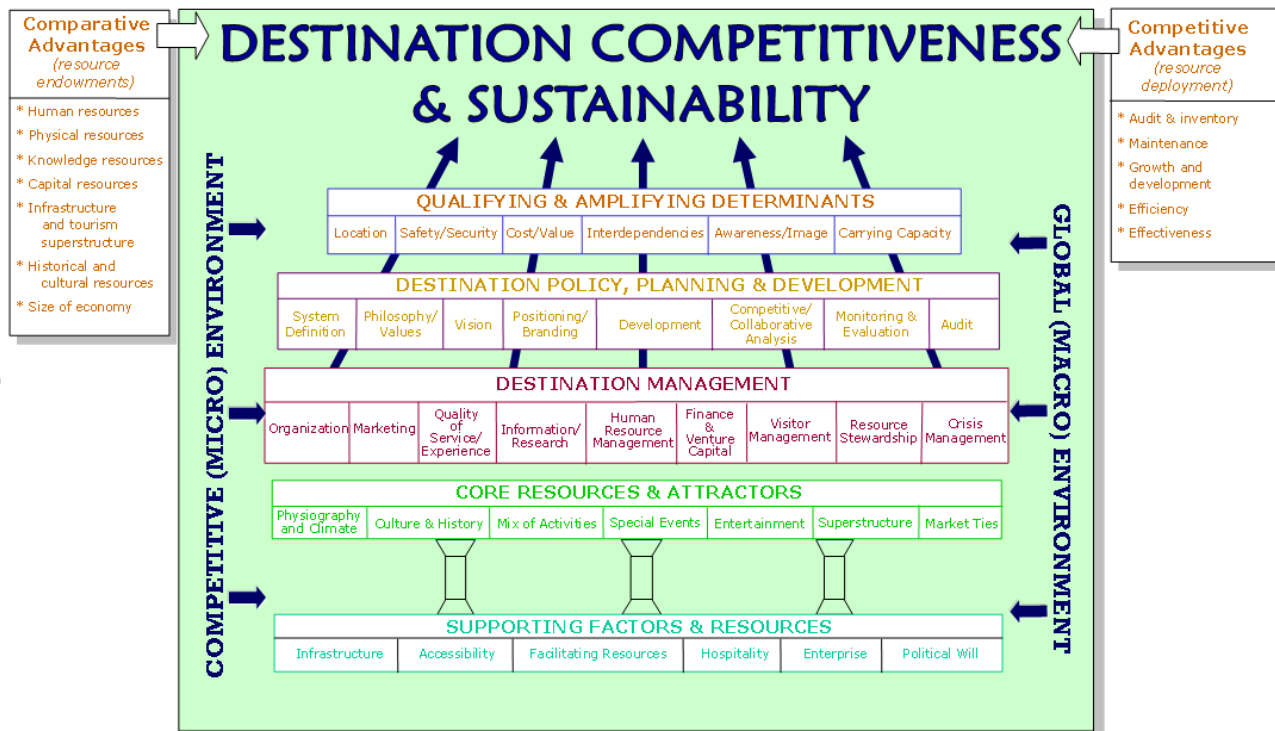
Figure 3.5 Choice and information processing in a visitor experience



This poses problems for estimating the choice model, because, taken over time, the outcome of a choice influences the choice itself (as well as, obviously, the choice affecting the outcome). Our impression is that most visitors to the Park are repeat visitors and, indeed, the estimated numbers compared with the population of the catchment area make it clear that this is so.

The bare choice model is also in conflict with the very rich multivariate model theories of destination choice found in the tourism literature, such as Crouch and Ritchie's:

Figure 3.6 Ritchie and Crouch's model of the tourism destination



Doc model(v13).ppt – © RITCHIE & CROUCH, APRIL 2003

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In previous research we have estimated elements of such a multivariate model ourselves, across the Council areas of Scotland. These were based amongst other things on topographical features such as mountains, lochs, forest and coasts and thus highly relevant to this study. However detailed visitor number data for a significant number of varied and relatively small areas is needed to estimate these. That routinely available from VisitScotland follows the operational boundaries of the former regional tourist boards, and so is grouped in a way that makes it unsuitable for estimating such models⁶. For the original implementation the model was based on data that had to be processed substantially to conform to Council areas, and it proved beyond the resources available to this project to tailor the available data to an area as small as the Park with its distinctive boundaries, or to purchase the basic survey data at Council area level or lower. We hope at a future date to construct a means of 'modelling down' to small areas, and will keep the LLTNPA in touch with our progress in this.

The third of the revealed approaches has been used extensively to obtain values of destinations associated with natural features such as forests and lochs. Consider a popular viewpoint that requires a significant drive to sample it. We would expect demand to vary with the cost of getting to the viewpoint i.e. there will be a demand curve and associated consumer surplus with any specified cost. Thus if we know the demand curve and we know the costs associated with each consumer we can identify the aggregate consumer surplus.

The demand curve itself can be estimated by looking at the current visitor pattern and their associated costs. After corrections for the potential number of visitors at each distance the relationship between visits and travel costs can be established and hence the overall consumer surplus (value). This approach is known as the Travel Cost Method (TCM).

Ideally values from the different methods should converge but this is rarely the case. In some cases there are good theoretical reasons. Consider, for example, a car park at the bottom of an important hill route. A contingent valuation would ask people how much they would be willing to pay to climb a) the specific hill b) a hill in the LLTNP or c) a hill in Scotland. Any value given by the travel cost method would be an unknown combination of all three values i.e. greater than the value of the single hill but not greater than the value for all hills.⁷

⁶ To be statistically valid, the input data for regression analysis has to include both areas that don't attract many visitors as well as those that do. VisitScotland naturally and quite properly concentrates its efforts on places that do draw visitors, but unfortunately these efforts include data collection, assembly, and publication. To obtain national coverage and not to discriminate against operators in sparse areas, it amalgamates into its organisational system the places that don't draw many visitors. Thus it not only 'censors' a particular part of the database, but for good organisational reasons statistically weakens the other part. In regression terms this means not only that the dependent variable is censored, but that the independent variables are corrupted.

⁷ Imagine one wanted to establish the value of the Science Museum. A contingent valuation of visitors to the museum would generate the appropriate estimate. The TCM valuation would include those who came to London and were indifferent between the Science and Natural History or even between the Science and any other London attraction.

C. Total value of landscape

In the study we have tried, as far as possible, to identify the activities people undertake in the National Park. Some of these, such as kayaking and hill walking, are free and we have utilised a Travel Cost Method estimate derived from a study by Hanley (1989) of £7.93⁸ as an estimate of the mean consumer surplus for this group. This surplus will include landscape values.

For commercial activities such as coach or boat tourism the benefits of the scenery would appear to be significantly offset by the costs of accessing that scenery. However the evaluations given are contingent on this cost i.e. the value of £6.50 is the mean surplus after taking these costs into consideration. Thus the net value of the landscape for this type of tourist is simply the number of activity days multiplied by £6.50.

For commercial activities such as golf or quad biking much of the satisfaction is assumed to come from the activity itself rather than the general environment in which it takes place (although specific course quality is of course a consideration in golfing). Clearly the scenery is extremely important for courses like Loch Lomond and The Carrick but to a considerable extent this is reflected in the fees charged. Magnificent scenery does not appear to be a free good if playing golf.

To summarise, the landscape provides aesthetic services to visitors of considerable value. The total value of landscape is assessed in Chapter 7.

Calculation of value in the visitor services chapter requires the identification of the number of visitors (activity days) being undertaken on each activity. Thus chapter 7 provides for the first time a comprehensive look at non-commercial activity and identifies, for example the numbers hill-walking or undertaking water sports.

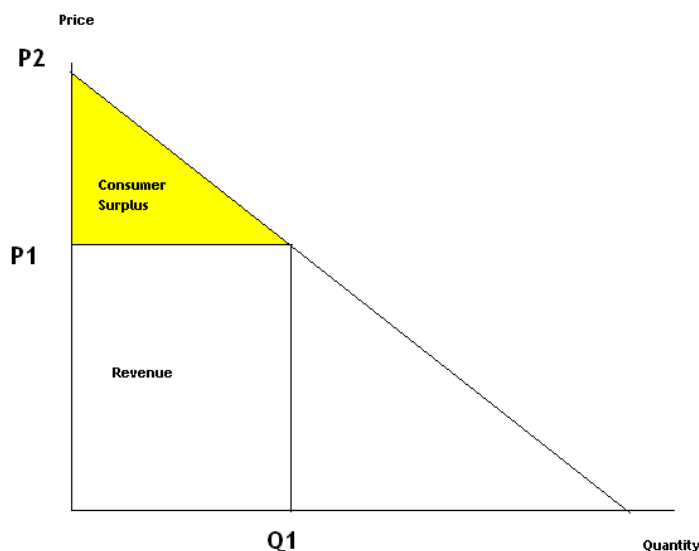
The penultimate chapter brings together the values calculated in the previous chapters with the resource use and presents them in the tabular structure discussed above. As might be expected the values are predominantly indicative but should be useful in identifying the importance of ecosystems in the economy of the park.

The final chapter summarises the report and draws some broad implications from the findings on priorities for the NPA.

3.6 Consumer surplus and demand elasticity

In the absence of any direct information on consumer surplus it is possible to estimate CS from a demand curve by assuming an elasticity. Consider a simple linear demand curve as shown in Figure 3.7 with an unknown arc price elasticity e . The consumer surplus is given by the triangular area $0.5 * (P2 - P1) * Q1$.

Figure 3.7 Consumer surplus



If we assume that the arc elasticity applies at the current output level then

$$e = ((Q1 - 0)/Q1) / ((P2 - P1)/P1) \quad \text{which gives } P2 = ((1 + e)/e) * P1 \quad \text{and } CS = 0.5 * P1 * Q1 / e$$

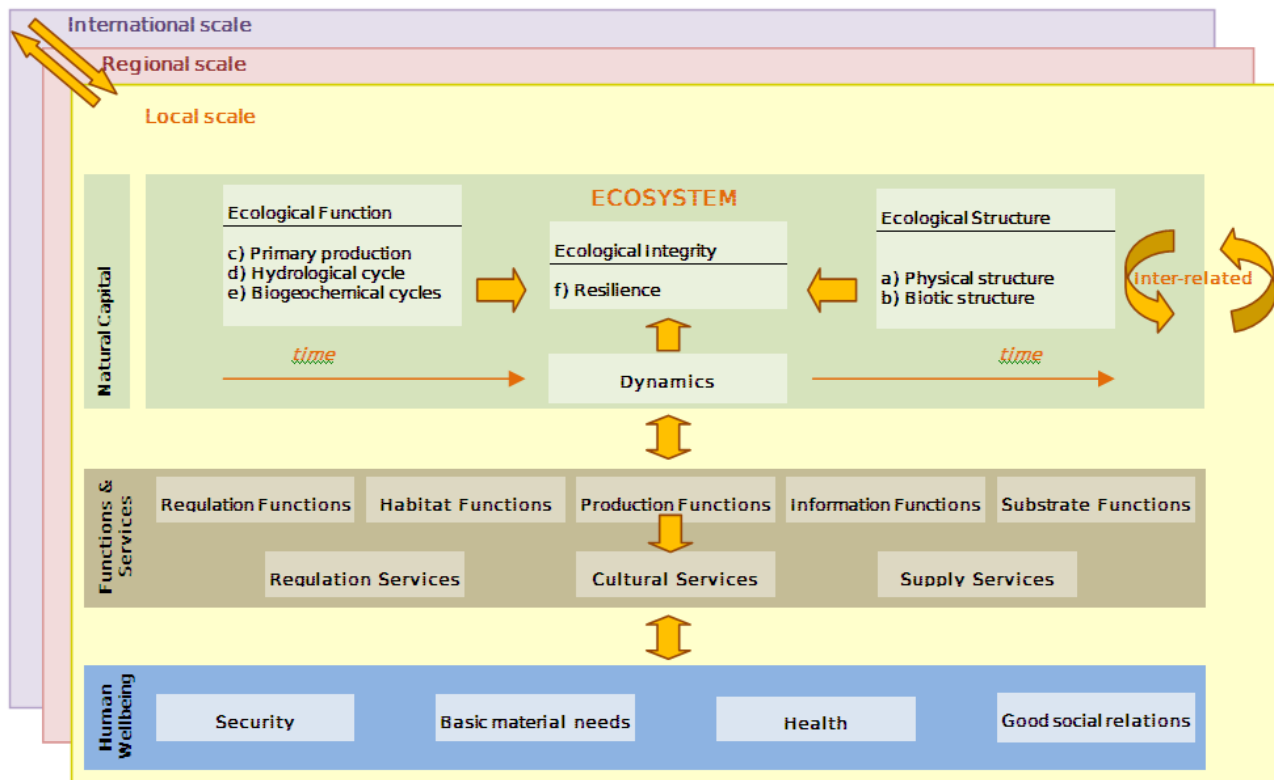
For a normal good we expect e to be about unity i.e. consumer surplus = half the revenue. Tourist purchases tend to be luxuries. Thus we might expect elasticities such as 1.5 and 2 and a crude conservative estimate might put the consumer surplus for an activity like boat trips to be around 25 per cent of the revenue.

⁸ price adjusted to 2010 values

3.7 Ecosystems services

One of the most positive outcomes of the United Nations' Millennium Commission was an agreement to clearly identify the impact of ecosystems in order to ensure that any environmental losses (or gains) over time were clearly identified. At a macro level it was a cry to ensure that, for example, the gain in GDP from the exploitation of the Amazon was offset by proper recognition of the loss to the world at large of the ecosystem.

Figure 3.8 Natural capital and human wellbeing: the ecosystem functions that enable the generation of flows of ecosystem services with impacts in all the basic components of human wellbeing



Source: Gómez-Baggethun E. and de Groot R. (2007) *Natural Capital and Ecosystems Functions: Exploring the Ecological Basis of the Economy*. *Ecosistemas* 16 (3): 4-14, September 2007. [http://rua.ua.es/dspace/bitstream/10045/7642/1/ECO_16\(3\)_02.pdf](http://rua.ua.es/dspace/bitstream/10045/7642/1/ECO_16(3)_02.pdf)

Three roles for ecosystems were defined: regulating services, provisioning (supply) services and cultural services.

1. Regulating services: The benefits obtained from the regulation of ecosystem processes, such as flood control and mitigation, air and water quality.

- **Climate regulation** natural systems affect climate locally (e.g. land cover type can affect temperature and rainfall) and globally (e.g. sequestering carbon).
- **Pollination** pollinators of many fruit and other crops are affected by habitat change.
- **Pest control** landscape changes affect agricultural pests and diseases.
- **Water flow regulation** run-off, flooding and aquifer recharge are affected by land cover type e.g. the change of wetland and forest into agriculture or urban areas.
- **Water quality regulation** soils are significant for the purification of fresh water, including nutrient stripping and the decomposition of organic wastes.
- **Erosion prevention** vegetation cover and type affects the stability of soils and the prevention of natural hazards like landslides.

2. Provisioning services: The products obtained from ecosystems

- **Food production** ecosystems are essential for producing food through agriculture.
- **Potable fresh water supply** freshwater comes from natural systems, such as rivers, lakes and aquifers.
- **Genetic resources** biodiversity provides the basis of biotechnology and plant breeding.
- **Raw materials** natural systems provide timber and wool, and, increasingly, biofuels.

3. Cultural services: The non-material benefits which people obtain from natural systems through spiritual enrichment, reflection, recreation and aesthetic and inspirational experiences.

- **Aesthetics** people find beauty and tranquillity in aspects of nature, reflected in housing locations, support for parks and scenic drives.
- **Heritage** people place high value on the maintenance of historically important landscapes, their man-made elements and culturally significant species.
- **Recreation** people choose to spend their leisure time based, at least in part, on the characteristics and attributes of natural areas.

At a qualitative level a great deal has been written but to date no quantified accounts have been produced. In their paper on the application of the ecosystems approach University of York et al (2010) identified the role of different ecosystems on services produced as shown in Table 3.2, where 5 is extremely important and 1 is relatively unimportant.

Table 3.2 Role of various ecosystems on services (University of York et al, 2010)

	Climate regulation	Pollination	Pest control	Water regulation	Water quality	Erosion prevention	Food production	Potable water supply	Genetic resources	Raw materials	Recreation	Aesthetics	Heritage
Urban	2	2		1	1		2		3	1	5	5	4
Agriculture arable		2	1				5		3	5	2	3	2
Agriculture pastoral	2	2		2	2	1	4	2			2	3	2
Plantations	5		2	2	2	3	2		3	5	4	4	3
Rivers and streams	2			5	5		3	5	3	1	5	5	4
Broadleaved woodland	5	3	5	5	4	5	2	2	5	5	5	5	4
Acid grassland	2		1	3		4	4	3	3	2	3	2	1
Calcareous grassland	3	5	2		5	4	3	4	4	2	3	5	3
Neutral grassland	2	4	4	3	2	3	3	3	3	2	4	4	4
Improved grassland	2	1	1	3	1	3	4	4	1	1	4	2	1
Dwarf shrub heath	2	4		4	2	4	2	2	3	2	4	4	4
Fen, marsh and swamp	2	1		3	5	2	1	4	4	2	2	2	2
Bogs	4		1	4	3	3	1	1	4	2	4	2	4
Maritime cliff						4			3		5	5	
Coastal salt marsh	3	2		4	2	4	2		4		3	4	3
Intertidal flats	3					3	1		4		4	4	3

Source: Haines-Young and Potschin (2007), Raffaelli et al (2007) in University of York et al (2010)

This table, when transposed, can link any service with natural assets e.g. hill walking with mountains; water supply with rivers and streams etc. Where the natural resource is extremely important the role of specific natural assets can be detailed; where the impact of the natural resource is limited e.g. electronic goods, then the other assets will be detailed. In most cases natural assets have an important role in business in the National Park. In virtually all cases, however, the delivery of goods and services requires built and human assets. Thus the application of eco systems ideas leads to the accounting framework discussed in Chapter 2.

3.8 Conclusion

This chapter discusses in a general sense the many problems both practical and conceptual in attempting to complete the accounting tables discussed in Chapter 2. The many solutions used are featured in the next chapters where we set about the task of valuing the National Park.

In section 3.4 we displayed the GVA information in the ONS regional accounts that covered the Park. The following table augments that with a summary of the GVA estimated by the methods shown in this section.

Table 3.3 Local GVA

Gross Value Added (ONS data) 2008				
	Perth & Kinross, Stirling	Lochaber, Skye & Lochalsh, Arran & Cumbrae, Argyll & Bute	East Dunbartonshire, West Dunbartonshire, Helensburgh & Lomond	National Park
Agriculture, forestry and fishing	92	85	11	13.3
Production	670	188	392	13.1
Construction	373	108	172	13.7
Distribution, transport and communication	957	429	500	69.7
Business services and finance	1079	205	678	41.1
Public administration, education, health and other services	1106	415	1062	68.9
Total GVA	4277	1430	2816	220

Source: ONS Regional Accounts NUTS3

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4 Register of assets

This chapter sets out what the Park is as a collection of objects, i.e. it aims to identify the assets, both natural and human based in the National Park that are available to produce the goods and services delivered and therefore generate value flows.

To our knowledge, it is the first time such a holistic list of assets has been compiled, bringing together information on what is in the Park both for local inhabitants and visitors and should provide a useful reference in the years to come. It includes, amongst others, roads, mountains, car parks, picnic sites, golf courses, slipways and visitor attractions that make up the National Park, alongside the equipment and buildings that house and are used by businesses and people. This overview of the assets within the Park is essential to proceed to estimating the value of the National Park.

As with many aspects of this project, information is patchy; some of the data is incomplete, dated or non-existent. We have signalled this where relevant.

4.1 Natural assets

We begin with water-based assets, rivers, and lochs, which contribute a wide range of recreation services addressed throughout the report, and also water itself (discussed as an ‘export’ industry in Section 6.6) and hydroelectricity (discussed in Section 6.5.). We then go on to discuss land-based assets including mountains, forests and farmland.

4.1.1 Lochs

The dominant feature of the Loch Lomond & The Trossachs National Park is Loch Lomond. The Loch is an extensive body of water measuring over 70m² and representing some 3.8 per cent of the total area of the Park.

In addition to Loch Lomond there are four other lochs of considerable size, namely:

- Loch Katrine,
- Loch Earn,
- Loch Eck, and
- Loch Venachar

All four of these have a surface area superior to 4m². There are a further 14 smaller lochs with a surface area of just over 140,000m².

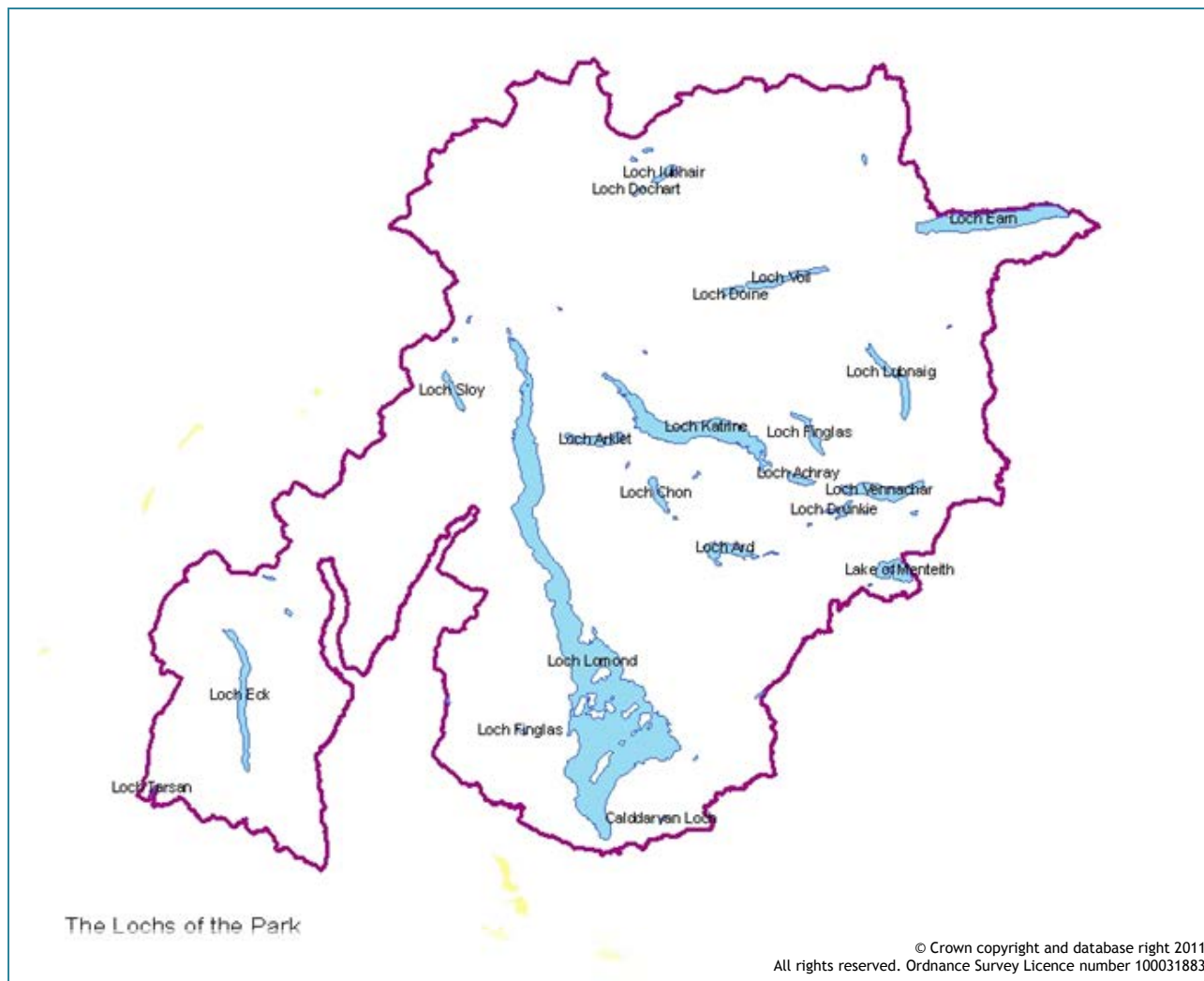
The names and sizes are shown in the following table and their location in the Park shown in Figure 4.1.

Table 4.1 Lochs within the LLTNP

Name of Loch	Area (m ²)	% of Loch Area	% of Park Area
Loch Lomond	70,392,160	58.2%	3.8%
Loch Katrine	12,778,218	10.6%	0.7%
Loch Earn	9,472,251	7.8%	0.5%
Loch Eck	4,325,610	3.6%	0.2%
Loch Venachar	4,003,205	3.3%	0.2%
Loch Lubnaig	2,537,011	2.1%	0.1%
Lake of Menteith	2,437,585	2.0%	0.1%
Loch Ard	2,311,622	1.9%	0.1%
Loch Voil	2,174,115	1.8%	0.1%
Loch Arklet	2,065,200	1.7%	0.1%
Loch Finglas	1,279,300	1.1%	0.1%
Loch Chon	1,172,341	1.0%	0.1%
Loch Sloy	1,051,600	0.9%	0.1%
Loch Achray	783,050	0.6%	0.0%
Loch Iubhair	727,340	0.6%	0.0%
Loch Drunkie	613,450	0.5%	0.0%
Loch Doine	571,650	0.5%	0.0%
Loch Dochart	216,428	0.2%	0.0%

Name of Loch	Area (m ²)	% of Loch Area	% of Park Area
Loch Finglas	142,750	0.1%	0.0%
Others	1,837,067	1.5%	0.1%
Total	120,891,951	100.0%	6.5%

Figure 4.1 Lochs in LLTNP



4.1.2 Islands

The number of islands in Loch Lomond is unknown and the subject of some controversy. Estimates vary between thirty to over sixty depending on one's definition of an island and the water level! Their total area is approximately 4km².

All islands are privately owned, except for the islands of:

- Inchcailloch, part of the Loch Lomond National Nature Reserve, which is owned by Scottish Natural Heritage and managed by the National Park Authority. The National Park's Ranger Service organises and delivers guided tours and events to school pupils and visitors.
- Buchinch (the Island of Goats) and Ceardach are property of the National Trust for Scotland.

Luss Estates manage all the islands to the west. Access to those islands is allowed, as long as the environment is respected.

Many islands have special conservation designations (e.g. Sites of Special Scientific Interest) due to the importance of their natural heritage, in particular visiting birds who use the islands to breed and nest during the summer months.

Only one island provides visitor accommodation, namely Inchmurrin Island.

There are a number of ferry services that enable access to many of the islands. The islands are also very popular with boat users, canoeists and kayakers.

The main islands are:

Buchinch, the Island of Goats: the whole island is covered with trees (Scots pine, birch, oak and rowan). The foundations of a small fisherman's hut can still be seen along with the remains of a former jetty. It has been uninhabited and completely unspoilt for centuries.

Clairinch and Keppinch: Clairinch was the first piece of land owned by a Buchanan (given by the Third Earl of Lennox to his clerk Buchanan in 1225). In 1934, the Buchanan Society re-acquired the island, and it is now part of the Loch Lomond NNR. This flat island is covered in oaks and holly. Keppinch (or The Kitchen) is a small manmade island to the north of Clairinch built in prehistoric times.

Ellanderroch, the Island of Oak: this tiny island is owned by the owner of the larger Inchfad island, only a few yards away, separated by shallow water. It is frequented by fishermen as the fishing is reputedly good.

Fraoch Island, or Heather Island: this small island near Luss is covered with birches, brambles and heather. Rumour has it used to be used as a prison for Luss' undesirables.

Inchcailloch, the Island of the Woman: this is the second largest and most accessible of Loch Lomond's islands, serviced by the ferry service from Balmaha Boat Yard. St Kentigerna, mother of St Fillan, settled on the island in 717AD. A church was built in her honour in the 12th or 13th century and was in use until the end of the 17th century. The graveyard however was used until 1947. The foundations of the church are still visible. Agriculture took place on the island until the end of the 18th century, remains of farm houses still in evidence. Subsequently, oak trees were planted for the commercial production of leather tannin. Today, the oak woodland is particularly important because of its rich flora and distinctive communities of mosses, lichens and birds. It is now owned by Scottish Natural Heritage and is managed by the NPA. A number of visitor developments have taken place: two trails, information and interpretation boards, seating, landing jetties, picnic site, toilets and a small campsite open during the summer months. The island is accessible to visitors with a wide range of abilities. A park ranger is employed during the summer months. Many school children visit Inchcailloch, and a number of events are organised and hosted on the island to attract visitors.

Inchconnachan, Colquhoun's Island: this island is particularly popular during the summer months to boaters who picnic on the shores of the small secluded bays. It was the holiday island of Lady Arran, who had a bungalow built in the 1920s. It was she who also introduced wallabies who have since colonised the island.

Inchcruin, Round Island: it is mostly wooded, with a couple of sandy bays, however, it is mostly rocky and unapproachable by boat. It was farmed until the mid 19th century. It is possibly used as a holiday retreat by its owners.

Inchfad, Long Island: a short canal at the northern end of the island was created to provide access by boat to the island's distillery. This is now closed, but the canal has been restored to full use. The island was farmed for many generations, remain of farm houses still in evidence. The lush green house attracts Loch Lomond deer, often found grazing on the fields.

Inchgalbraith: this was probably originally a crannog. The remains of a medieval castle can still be seen, occupying most of the area of this tiny island.

Inchlonaig, Yew Tree Island: named after the yew trees replanted by King Robert the Bruce after using the wood for the bows of his archers at the Battle of Bannockburn. Evidence of occupation by man dates back to 5000BC. Deer was farmed on the island for centuries, and some can still be seen at times. Remains of dwelling and kilns are in evidence. A stone built cottage is now used as a holiday home. It is a Site of Special Scientific Interest.

Inchmoan, Peat Island: the peat found on the island was used by Luss villagers as fuel. Ruins can be found. It is now owned by Luss Estates. Its sandy beaches are very popular during the summer months.

Inchmurrin, St Murrin's island: it is the largest island on Loch Lomond, and the largest island in a body of freshwater in the British Isles, and boasts several beaches and piers. The ruins of Lennox Castle can still be seen. The island was a deer park for years, and finally sold in the early 20th century. It is now farmed (beef cattle and sheep). This is the only island that has a hotel. Lodges were built at the south eastern shore, and are frequented by naturists. The Balmaha mail boat makes regular journeys to the island, providing a ferry service which is complemented by the hotel's privately operated one.

Inchtavannach, Island of Monks: a large house was built on the site of an old monastery in 1760, and is still occupied today. Its owners farm livestock and keep horses.

Isle of Inveruglass, Island of the Black Stream: this stream corresponds to the Inveruglas water that flows down the hillside from Loch Sloy. The island is wooded, and ruins of a castle (sacked by Oliver Cromwell in the 17th century) are hidden amongst the high pines.

Tarbet Isle, Isle of the Portage: the island takes its name from Tarbet village, and the isthmus (narrow strip of land) on which it stands. The portage ('towboat') refers to the isthmus where Vikings could drag their longboats to finally reach Loch Lomond, and sail the Loch and access its towns and villages.

Inland Rock Outcrop and Scree Habitats	3,290,091	0.2%	0.5%
Limestone Pavements	118,787	0.0%	0.0%
Lowland Beech and Yew Woodland	16,456,233	0.9%	2.4%
Lowland Dry Acid Grassland	36,265,085	1.9%	5.2%
Lowland Fens	21,145,718	1.1%	3.0%
Lowland Heathland	114,550,472	6.1%	16.4%
Lowland Meadows	1,494,632	0.1%	0.2%
Lowland Mixed Deciduous Woodland	8,877,185	0.5%	1.3%
Maritime Cliff and Slopes	32,515,204	1.7%	4.7%
Mesotrophic Lakes	19,007	0.0%	0.0%
Mountain Heaths and Willow Scrub	39,529,538	2.1%	5.7%
Native Pine Woodlands	1,990,664	0.1%	0.3%
Purple Moor Grass and Rush Pastures	31,897,786	1.7%	4.6%
Reedbeds	452,898	0.0%	0.1%
Upland Birchwoods	22,916,848	1.2%	3.3%
Upland Calcareous Grassland	3,454,369	0.2%	0.5%
Upland Flushes, Fens and Swamps	3,886,854	0.2%	0.6%
Upland Hay Meadows	3,677,013	0.2%	0.5%
Upland Heathland	107,177,306	5.7%	15.4%
Upland Mixed Ashwoods	2,653,769	0.1%	0.4%
Wet Woodland	22,875,039	1.2%	3.3%
Wood-Pasture and Parkland	119,226	0.0%	0.0%
Rivers	17,032	0.0%	
Water	131,999,181	7.1%	
No corresponding priority BAP habitat	656,927,156	35.2%	
Other	380,162,489	20.4%	
Total	1,866,410,214	100.0%	100.0%

The two largest types are Blanket Bog (30.6 per cent of detailed land) and Lower and Upper Heathland (31.8 per cent). The latter is suitable for sheep and cattle grazing and these are the dominant forms of agricultural enterprise.

The National Park was awarded this designation because of the special features this area boasts.

A number of documents explore and identify in much detail species and geological features of scientific interest which can be found on the NPA's website.

4.1.5 Mountains

The National Park contains 92 identified separate peaks of over 1000ft, of which 21 are over 3000ft (Munros) and 19 over 2500 ft (Corbetts). Table 4.3 lists the Munros and Corbetts and eight of the lower summits that are particularly popular with hill walkers, climbers and hikers, and Figure 4.4 illustrates them.

Table 4.3 Munros, Corbetts and other summits of significance within the LLTNP

Name	Metres	Feet	Popularity	Main Objective
Munros				
Ben More	1174	3852	9	1
Stob Binnein	1165	3822	9	
Ben Lui	1130	3707	9	1
Cruach Ardrain	1046	3432	8	1
Ben Oss	1029	3376	8	1
Beinn Challum	1025	3363	8	1

Name	Metres	Feet	Popularity	Main Objective
Beinn Ime	1011	3317	9	
An Caisteal	995	3264	8	1
Ben Vorlich (Loch Earn)	985	3232	9	1
Beinn Dubhchraig	978	3209	8	
Stuc a'Chroin	975	3199	9	
Ben Lomond	974	3196	10	1
Meall Glas	959	3146	7	1
Beinn Tulaichean	946	3104	8	
Ben Vorlich (Loch Lomond)	943	3094	8	1
Beinn a'Chroin [Beinn a'Chroin East Top]	940	3084	8	
Beinn Chabhair	933	3061	8	1
Beinn Narnain	927	3041	9	
Sgiath Chuil	921	3022	7	
Ben Vane	916	3004	8	
Beinn a' Cleibh	916	3004	8	
Corbetts				
Beinn an Lochain	901	2956	9	1
Beinn Odhar	901	2956	7	
The Cobbler [Ben Arthur]	884	2900	11	1
Beinn Chuirn	880	2887	4	1
Ben Ledi	879	2884	9	1
Stob a'Choin	869	2851	4	
Beinn Luibhean	858	2815	6	1
Meall an t-Seallaidh	852	2795	9	1
Beinn nan Imirean	849	2785	4	
Ben Donich	847	2779	8	1
Benvane	821	2694	4	
Beinn Chaorach	818	2684	4	1
Stob Coire Creagach [Binnein an Fhithle]	817	2680	4	
Beinn Each	813	2667	4	1
Creag Mac Ranaich	809	2654	4	
The Brack	787	2582	7	
Beinn Bheula	779	2556	7	1
Stob Fear-tomhais [Beinn Stacath]	771	2530	4	
Beinn a'Choin	770	2526	4	
Other				
Ben Venue	729	2392	9	1
Beinn Eich	703	2306	6	
Beinn Bhreac	681	2234	7	1
Beinn Dubh [Mid Hill]	657	2156	9	1
Ben A'an	461	1491	9	1
Conic Hill	361	1184	11	1
The Fruin	361	1184	6	1
Ben Bowie	313	1027	9	1

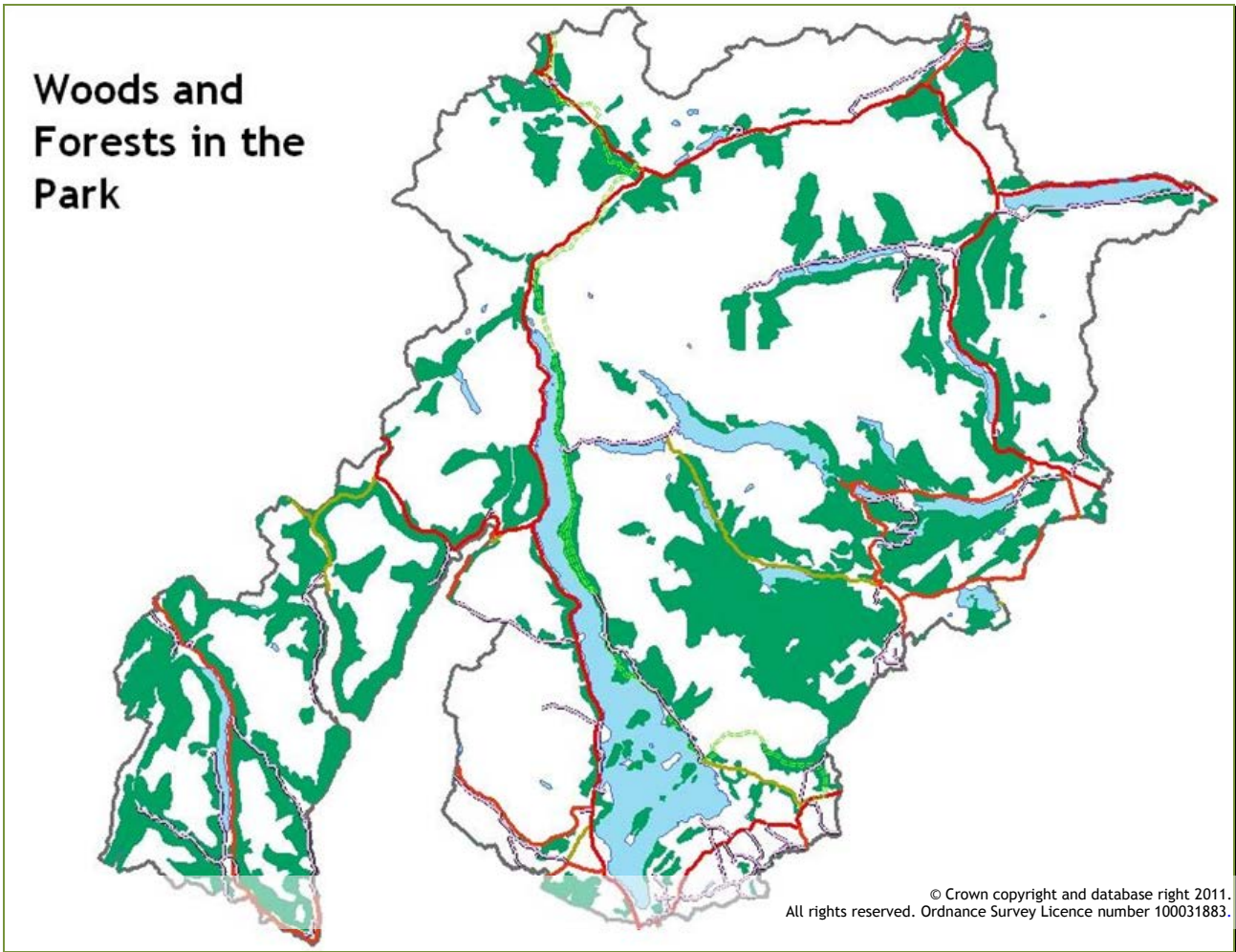
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The Park's forest resources are already substantial, and are set to grow significantly over the next 20 years. Woodlands currently occupy almost exactly a quarter of the Park, 474 km², and this represents a little over 3.5 per cent of Scotland's 13,430 km² of forest, or 1.5 per cent of the UK's 28,460 km².

Active efforts are being undertaken to enhance the forest asset and simultaneously the water services provided from the Park. In 2005 Scottish Water, which owns 960 km² around Loch Katrine, began a 150-year lease of the land to the Forestry Commission. The Commission is planting native species from local seeds, and encouraging natural regeneration of around 200km². The forest will eventually comprise birch and Scots pine, with oak on the lower slopes near the loch, as well as hazel, rowan, alder, willow, juniper, ash, bird cherry, and aspen. Together with contiguous tracts being regenerated by the Royal Society for the Protection of Birds near Inversnaid it will be the largest deciduous forest in Scotland.

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Figure 4.5 Map of woods and forests in the LLTNP



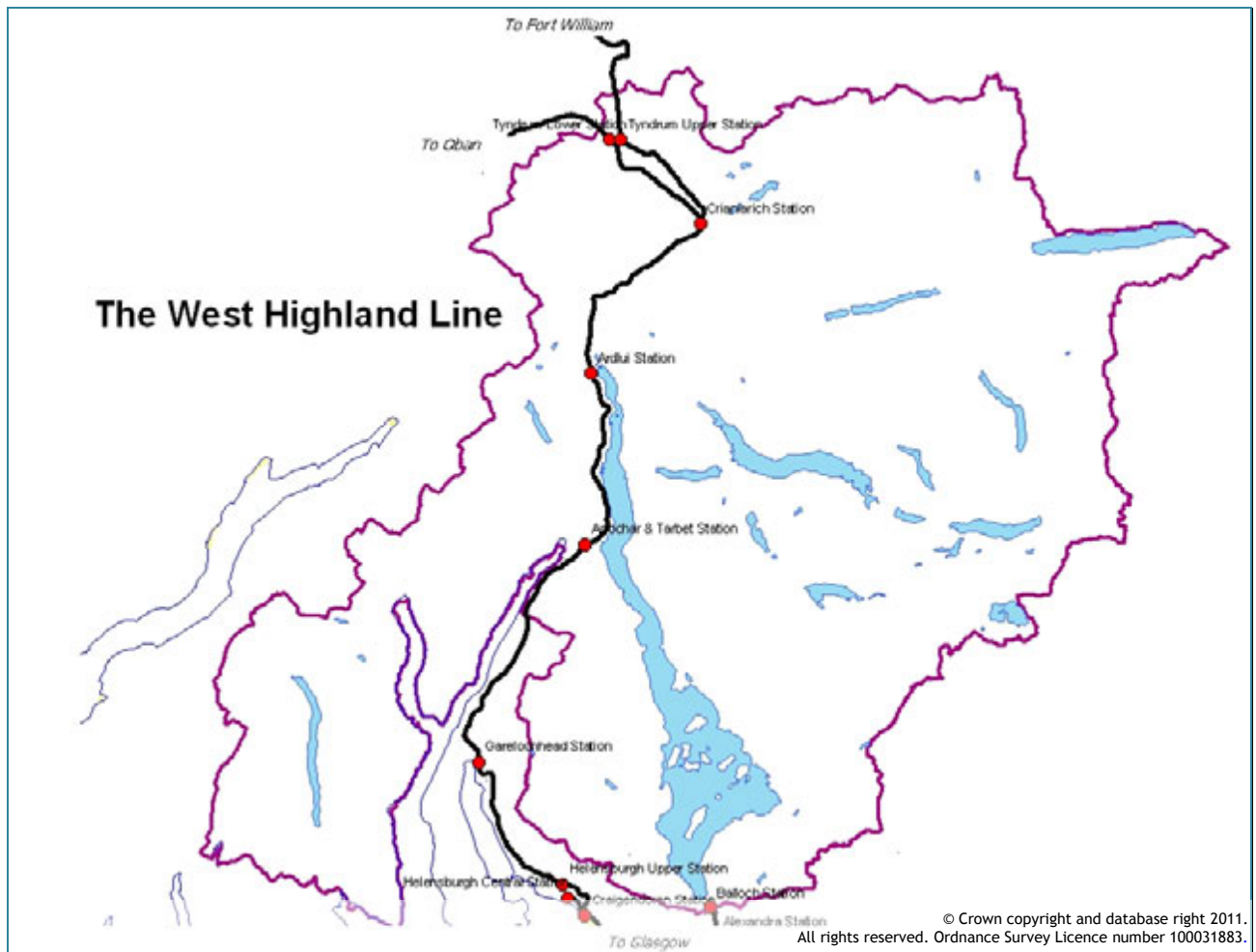
4.2 Built assets

4.2.1 The railway

Half of Balloch Railway Station is included within the formal boundaries of the National Park.

The only other railway in the National Park is the West Highland line, route shown below.

Figure 4.6 The West Highland Railway Line



In total, there are 52.99 km of railways in the Park.

However, because of the losses associated with the line, which are substantial, it might be argued that the railway is not an asset. For the purposes of this report we ignore the direct expenditure of tourists on the line and simply count the additional value created amongst travelling visitors by the scenery.

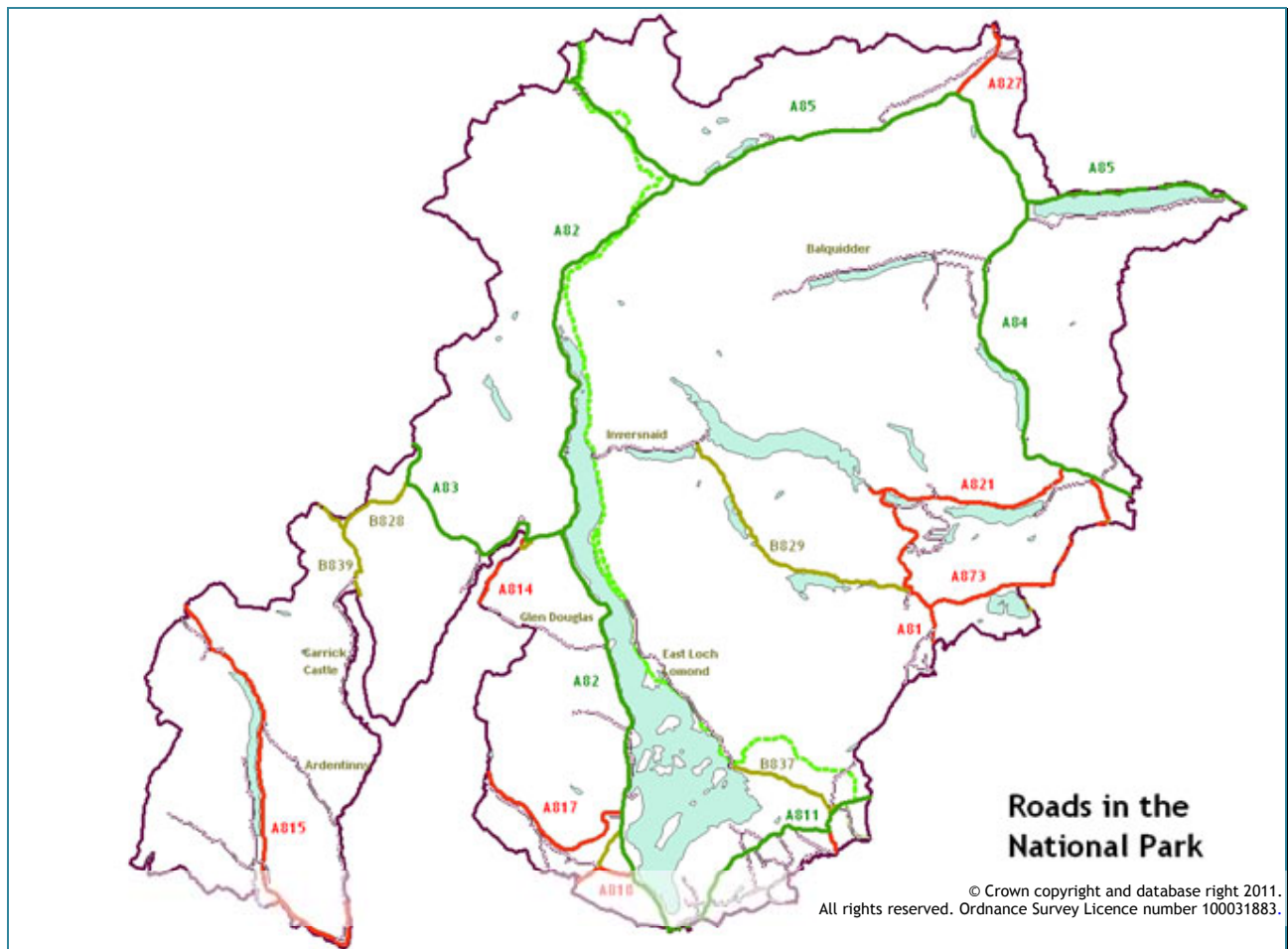
4.2.2 Roads

There are just under 500 kilometres of roads crisscrossing the National Park, the majority being minor roads:

- trunk roads: 155.4km
- A roads: 91.7km
- B roads: 40.7km
- minor roads: 209.9km

Table 4.4 and Figure 4.7 detail and illustrate the roads within the National Park boundaries.

Figure 4.7 Main roads in the LLTNP



Maintenance cost figures per kilometre were obtained from Audit Scotland's report *Maintaining Scotland's Roads* (2011). These do not take into account the backlog of road works identified, which was costed at £40,000 per kilometre of road.

Table 4.4 Roads, length and estimated maintenance costs in the LLTNP

Number	Metres	Maintenance Cost/km	Total Maintenance Cost	Estimated Capital Value
Trunk roads				
A811	14,755	£47,500	£700,839	£7,008,391
A82(T)	59,767	£47,500	£2,838,911	£28,389,105
A83(T)	16,069	£47,500	£763,273	£7,632,726
A84(T)	23,804	£47,500	£1,130,692	£11,306,922
A85(T)	41,035	£47,500	£1,949,183	£19,491,827
A Roads				
A809	1,395	£9,400	£13,112	£131,122
A81	15,842	£9,400	£148,915	£1,489,155
A814	3,456	£9,400	£32,486	£324,855
A815	20,117	£9,400	£189,104	£1,891,040
A817	11,554	£9,400	£108,606	£1,086,055
A818	3,895	£9,400	£36,613	£366,129
A821	22,992	£9,400	£216,120	£2,161,203
A827	5,178	£9,400	£48,672	£486,720
A873	13	£9,400	£120	£1,203
A880	7,302	£9,400	£68,640	£686,402

Number	Metres	Maintenance Cost/km	Total Maintenance Cost	Estimated Capital Value
B Road				
B8034	462	£9,400	£4,345	£43,449
B822	177	£9,400	£1,660	£16,602
B828	5,027	£9,400	£47,256	£472,564
B829	17,114	£9,400	£160,870	£1,608,695
B832	2,560	£9,400	£24,065	£240,647
B837	6,588	£9,400	£61,927	£619,267
B838	1,006	£9,400	£9,455	£94,553
B839	6,749	£9,400	£63,443	£634,429
B858	997	£9,400	£9,367	£93,674
Minor roads				
South Loch Earn	12,268	£9,400	£115,316	£1,153,164
Inversnaid	7,661	£9,400	£72,016	£720,158
Glen Luss	3,602	£9,400	£33,859	£338,590
Glen Fruin	10,708	£9,400	£100,652	£1,006,518
Glen Douglas	6,512	£9,400	£61,213	£612,129
Forest Drive	10,408	£9,400	£97,838	£978,383
East Loch Lomond	11,795	£9,400	£110,874	£1,108,743
Coillesan	3,060	£9,400	£28,766	£287,661
Carrick Castle	8,578	£9,400	£80,631	£806,312
Balquhiddy	12,877	£9,400	£121,044	£1,210,435
Ardentinny	12,505	£9,400	£117,550	£1,175,498
Other	109,934	£9,400	£1,033,384	£10,333,835
Total	497,761		£10,600,816	£106,008,163

The above simple analysis suggests that the road network within the Park costs just over £10m a year to maintain and has a capital value around £100m assuming a 10 year life.

4.2.3 Car parks

Car parking is the key interface between transport and activity and the LLTNP seems to be extremely well endowed. Where there is some shortage, as on the east coast of Loch Lomond, there is also too little road capacity. As anyone who travels the A82 southwards on a summer Sunday evening can confirm, the road capacity is simply not adequate for the numbers who have happily parked in the LLTNP for the day.

The car park list was compiled from lists provided by the Forestry Commission (Argyll Forest Park and Queen Elizabeth Forest Park), the LLTNP and a survey of the west side of the loch compiled in 1996. In addition data was extracted from the OS maps of the Park and from personal knowledge. For example the large car park on the old railway station site at Aberfoyle was omitted.

Although as comprehensive as possible the work undoubtedly omits some areas used extensively for car parking and possibly includes others that are now redundant. Reconstruction of the A82 and A83 over the last decades has left a number of “lay-bys”, sections of straightened road that are or can be used as car parks. The obvious example is at Duck Bay, an extended and popular shore side road. Not all of these “lay-bys” have been included. There are also a number of spots where vehicles leave the road to park by a loch side. If there is no surface these have also not been included.

Table 4.5 gives the broad details.

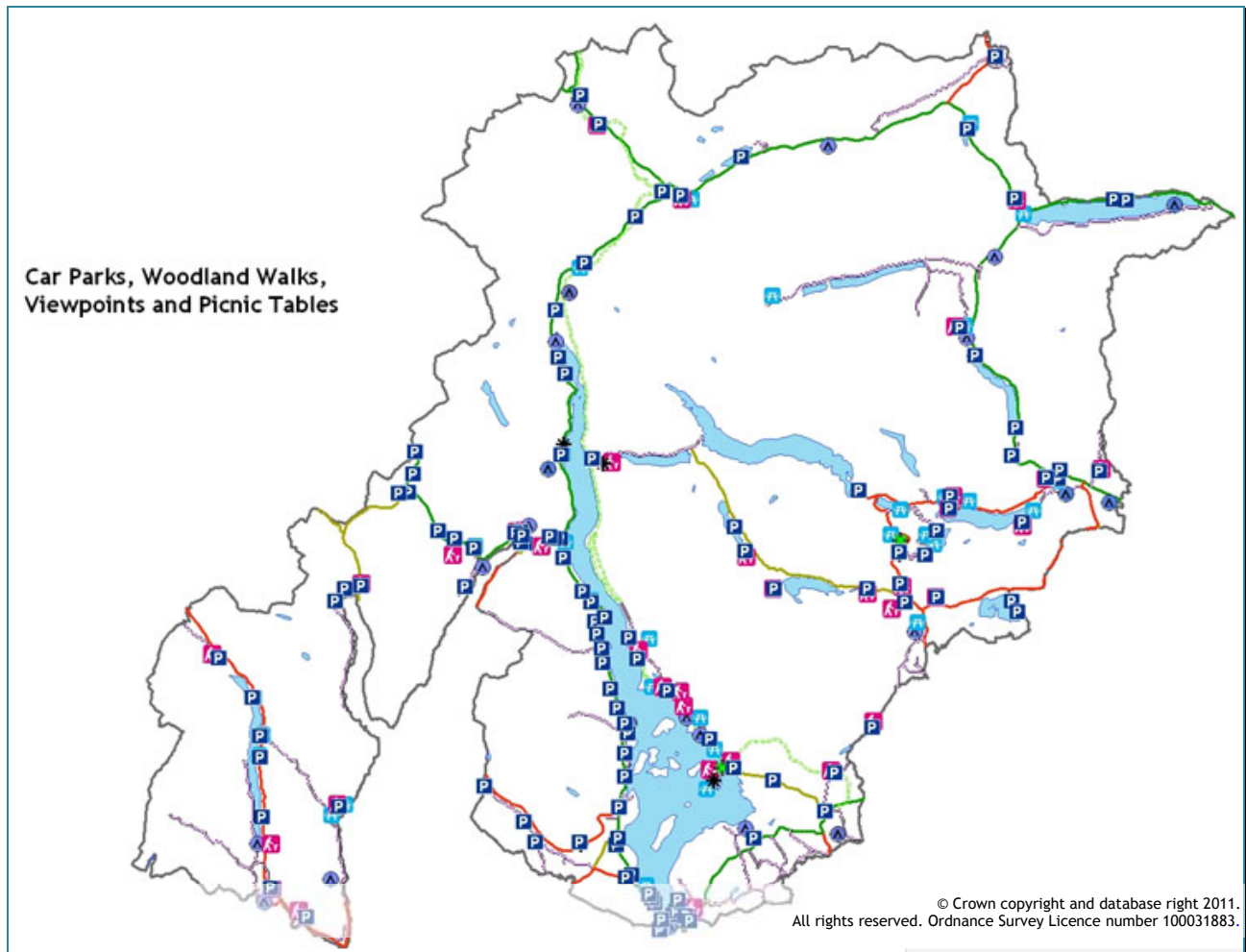
Table 4.5 Car parking capacity by type of car park

Purpose	Capacity (spaces)	%
Short Rest	177	3.4%
Walking	2057	39.9%
Shoreside	435	8.4%
Parkland	245	4.8%
Mountains & Lochs	1447	28.1%
Village Visit	795	15.4%
TOTAL	5156	100.0%

Where traffic is very light e.g. south of Lochgoilhead to Carrick Castle or West of Balquhidder, there are a number of spots to pull off and park. There are, as a result, no formal parking spots. There is also very extensive private parking in the grounds of hotels, restaurants and visitor attractions.

The identified parking locations together with information on Woodland walks and viewing points are shown in the following figure.

Figure 4.8 Car park locations in LLTNP



Facilities at car parks vary largely depending upon size. The David Marshall Lodge at Aberfoyle has a capacity of 163 car parking spaces for example, also providing toilet and refreshments. This pattern is repeated for Lomond Shores (capacity 250), and Luss 190. Table 4.6 shows that although less than a quarter of car parks have facilities, 75 per cent of people will have access to toilets and over 40 per cent to refreshments on site.

Table 4.6 Facilities at car parks

Facility	Number	%	Capacity	%
Table	33	28.2%	2066	40.1%
Toilet	29	24.8%	3943	76.5%

The cost quoted in the literature of constructing a space for car parking varies dramatically. If no charge is made for land (the norm in the LLTNP) and little physical work is required, a rock bottom price for a soft surface would appear to be of the order of £3250 per space. For a large tarmacked area the cost is around £5,000. Of course if the area is hilly (such as the David Marshall Lodge) these costs can double easily.

Assuming a 50:50 hard/soft and minimum cost we obtain a capital value for car parks of £22.6m. A 25 year life suggests that a sum approaching £1m p.a. should be set aside for car park maintenance.

4.2.4 Marinas, jetties, slipways and harbours

The National Park has many marinas, jetties and harbours. Whilst some are owned and managed by the public sector, many are under private ownership.

Table 4.7 Marinas, jetties, slipways and harbours in the LLTNP

Marina, jetty, slipways or harbour name	Loch	Details
Creag-Ard House B&B, Milton, Aberfoyle,	Loch Ard	
Ardanaiseig Hotel, Kilchrenan	Loch Awe	
Kilchurn Castle	Loch Awe	
Sithe Mor House B&B jetty, Kilchrenan	Loch Awe	
Taychreggan Hotel Jetty,	Loch Awe	
The Coylet Inn	Loch Eck	
Ardlui Marina/Jetty,	Loch Lomond	Power, water, crane, diesel and petrol available / (£15 per night), Can get very busy in the summer and holiday weekends, rafting sometimes required, power and water
Auchenheglish lodges	Loch Lomond	
Balloch Slipway, Adjacent to park Ranger HQ	Loch Lomond	Pick up and drop off only
Balloch, Balloch Park jetty	Loch Lomond	Shallow, no fendering, large under water pole on north side
Balloch, Duncan Mills jetty,	Loch Lomond	Put down and pick up only
Balloch, River Leven Slipway	Loch Lomond	Can be very busy,
Balmaha	Loch Lomond	Outside pier, public jetty
Balmaha Boatyard	Loch Lomond	Private, berthing by arrangement only / Fixed jetties and swing moorings in shallow sandy bay. Slipway and hard storage
Cameron House	Loch Lomond	Marina strictly members only, Patrons may use jetty in front of Hotel by arrangement. Secure pontoon berths for boats up to @50ft. Fuel and pump out.
Drumkinnon Bay (Balloch) slipway	Loch Lomond	Run by the Park Authority's Ranger Service. The slipway closes at 10pm but offer secure parking and chain down points for trailers. There are jetties for getting passengers on and off and the slipway offers deep water for bigger boats.
Duck Bay-Arden jetty,	Loch Lomond	Patrons only
Inchcailloch Island jetty,	Loch Lomond	Sail and dinghies only
Inchconnachan Island jetty	Loch Lomond	Only for use when Park Authority boat is present for visiting orientation centre
Inchmurrin Island	Loch Lomond	Patrons only
Inversnaid, Outside Pier public jetty	Loch Lomond	Inside pier patrons only, Difficult to access depending on wind.
Inveruglas jetty	Loch Lomond	Public jetty; Toilets at tea shop
Loch Lomond Marina, Balloch	Loch Lomond	Limited number of pontoon moorings on the River Leven. Slipway and hard storage. No Crane
Luss	Loch Lomond	Public jetty; Toilets on pier
Milarochy Bay Slipway	Loch Lomond	Can also be busy especially at the weekends. The Slipway runs onto the shore and can be quite shallow. This slipway is manned by the Park Authority.
Riverside Leisure Ltd, Balloch	Loch Lomond	Traditional working style boat yard. Fixed jetty pontoons for boat up to @30ft.
Rowardennan, Public pier, south side for ferry only.	Loch Lomond	
Sweeny's Yard, Balloch	Loch Lomond	Pontoon berths on both sides of the Leven at Balloch Bridge. One long jetty on West side with secure access and cameras. Various small jetties on East side with some trailer storage
Tarbet jetty	Loch Lomond	Public jetty; toilets in car park
The Cruin Restaurant	Loch Lomond	Patrons only
Bayners tackle shop	Loch Lubnay	
Loch Tay Activity Centre (Legend Sailing)	Loch Tay	
Harbour Cafe,	Loch Venachar	
Loch Venachar Sailing Club	Loch Venachar	

Marina, jetty, slipways or harbour name	Loch	Details
Lochearnhead Watersports	Lochearn	
Riverside Boat Yard, River Leven (Next to weir),	River Leven	Overnight berthing by arrangement, diesel and water, engineer & crane services available

4.2.5 Other built assets

The 'conventional' economy of the Park depends upon the presence of buildings, and in some cases plant and equipment. In addition to those already included above, mainly in connection with transport and visitors, accommodation, hospitality and catering premises, and some below under the heading 'cultural assets', mainly related to visitors these include

- major constructions for the supply of water and electricity (dealt with in sections 6.5 and 6.6 below),
- public service buildings such as the 16 primary schools across the Park and McLaren High secondary school in Callander, doctors' surgeries and related health facilities, administrative public offices for local authorities and statutory bodies including the LLTNPA's own offices, depots and other facilities
- commercial buildings, especially shops and some offices
- housing, comprising 7900 household spaces (Census 2001), of which 1150 (14 per cent) are second homes, plus communal housing provision

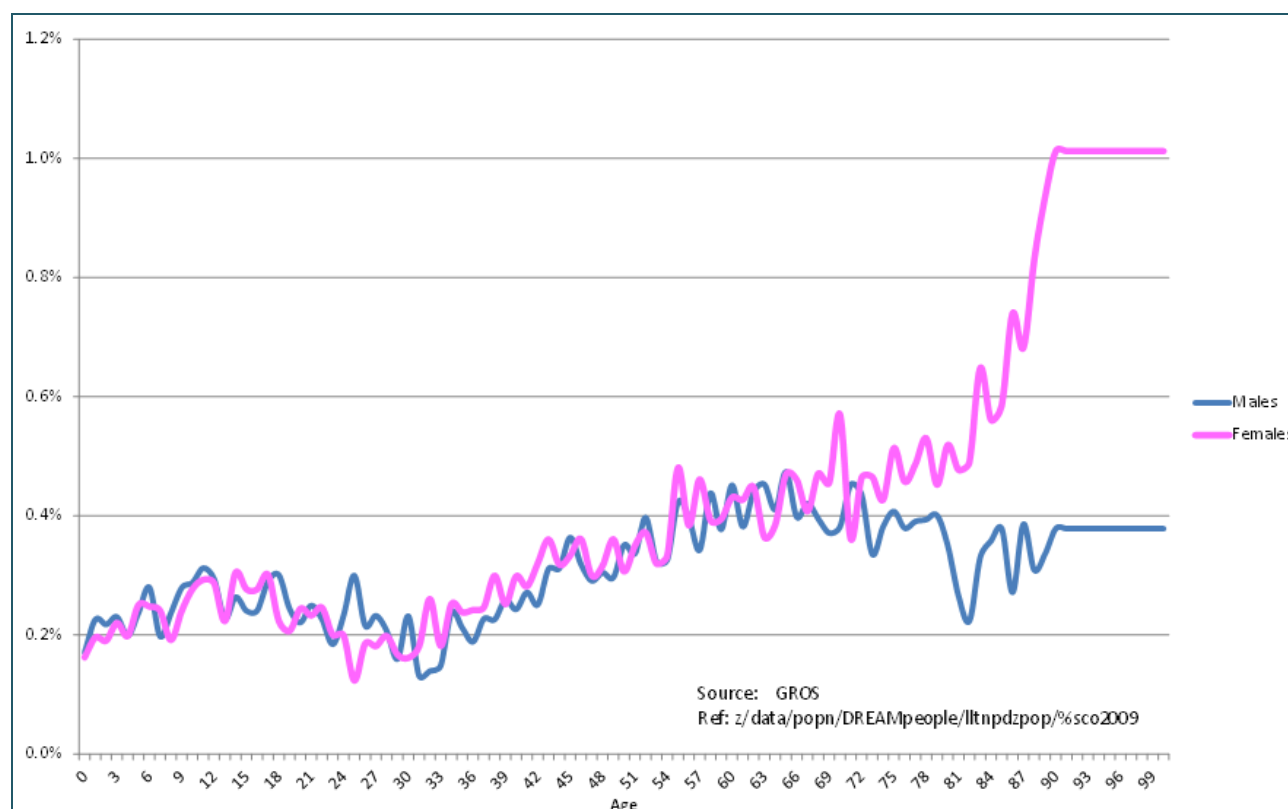
4.3 Human assets

4.3.1 Population

A. Current population characteristics

The population of the Park is 15,500 people (2009 mid-year estimate). Overall this is nearly exactly 0.3 per cent of the Scottish population, but when the population is broken down by age and gender the proportion of Scotland varies from 0.1 per cent for men in their early thirties and women in their mid-20s to 1.0 per cent for women over 90.

Figure 4.9 Park share of Scottish population by age and gender

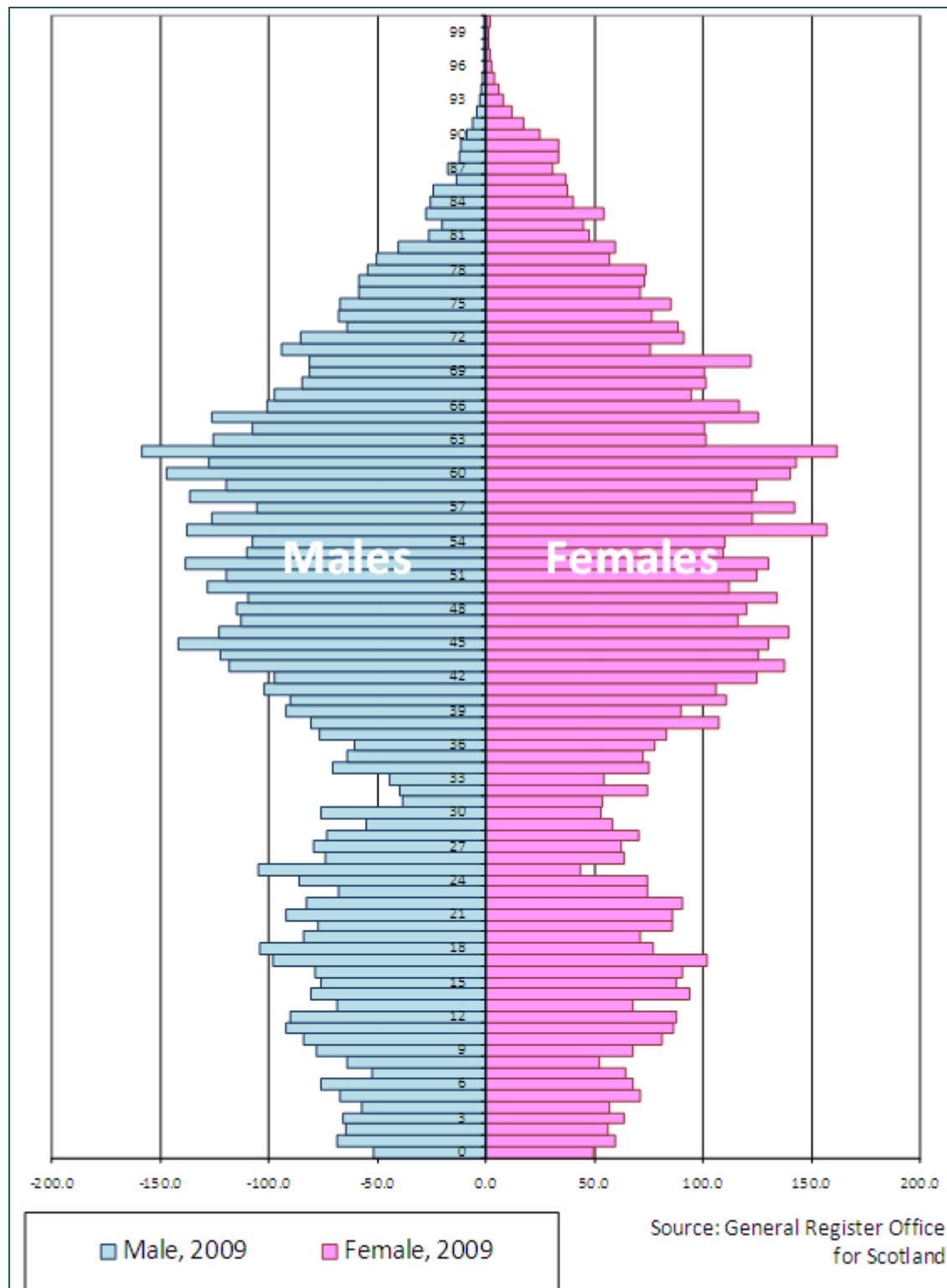


The specific very high figures for elderly women are associated with the presence of a number of care homes in Stirlingshire and, of course, their presence may be considered partly a consequence of the National Park's special features.

The consequence is that in the National Park the tendency to have more old people and fewer in their 'working prime' is exaggerated. As Figure 4.10 shows there are more than three times as many aged 62 as are aged 32.

The 'waist' of missing people in their twenties is very much tighter than most places in Scotland, even most rural places. The reasons for this can be seen in later discussion on migration.

Figure 4.10 Age distribution of the National Park population (2009)



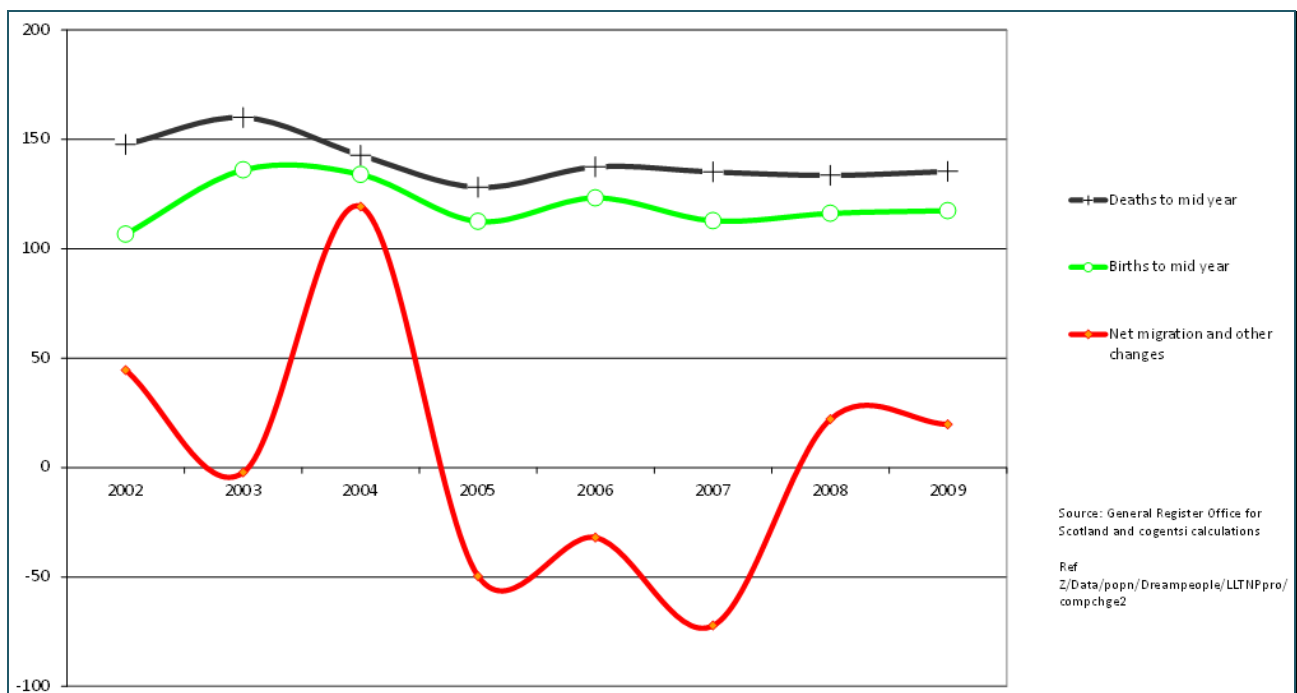
Since the National Park's inception, the trend of population has been downward, with 200 people being 'lost' over the eight years for which we have data.

Figure 4.11 Total population 2001-2009 (at mid-year point): the population trend is down



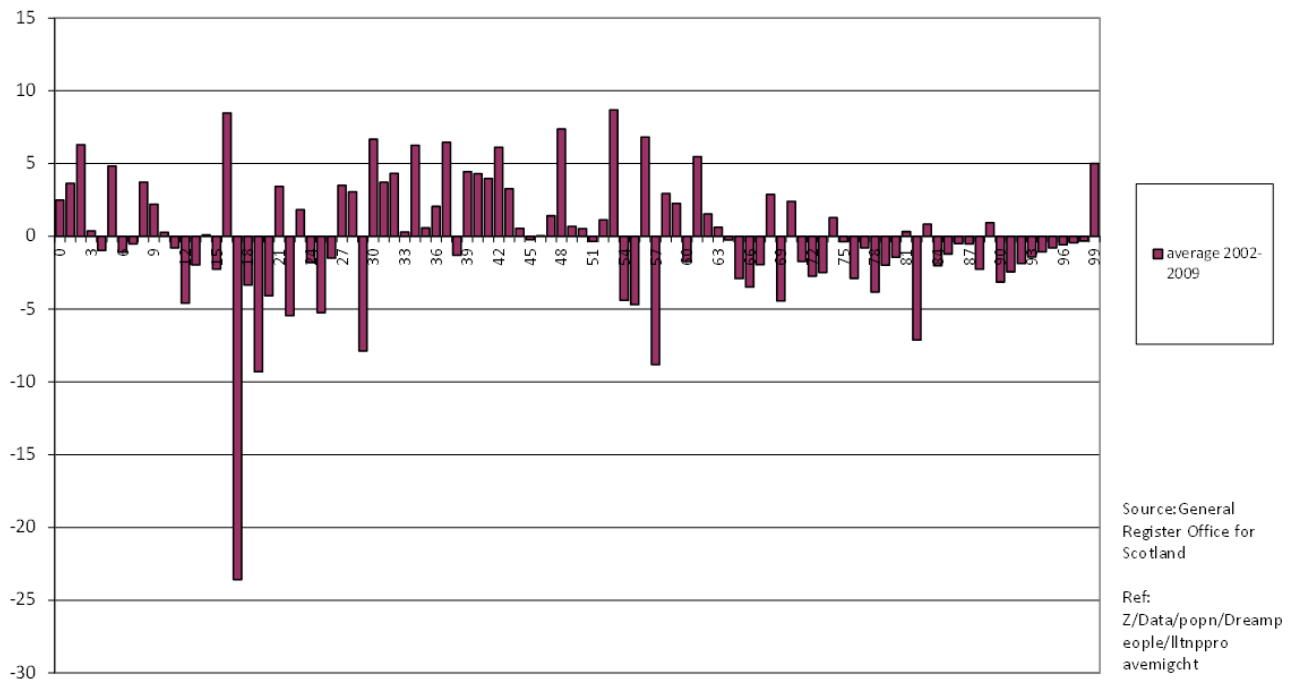
The mean annual loss is primarily a consequence of the fact that deaths, in recent years typically just over 140, exceed births, just under 120, by about 25 per year. These are both fairly stable, but year to year variations are caused by wide cycles in net migration:

Figure 4.12 Components of population change: natural change drives long run population trends but migration fixes the year-to-year cycles



However, although migration has been neutral overall, it has been far from neutral in terms of the age distribution.

Figure 4.13 Net migration by age: the loss of 17 year olds is the most dramatic migration feature

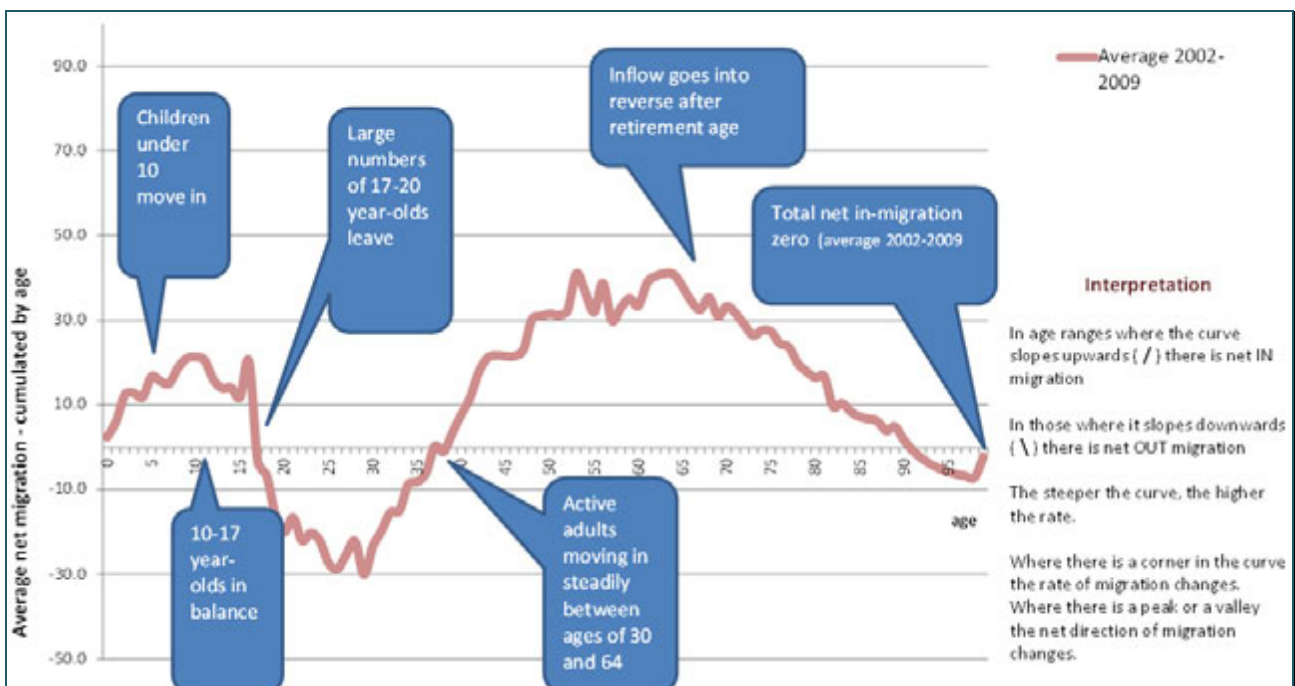


As the above figure shows the removal of 40 older teenagers (primarily to go to college), as elsewhere in rural Scotland, is the most striking feature of the age migration pattern, and it continues through the twenties, but the same number of people of retirement age also move out.

The ages where there is net movement into the Park are 30-60, and it is clear that younger adults from this group bring very young children. Older children do not, on balance, move into the Park, no doubt in part because of the long distances to secondary schools.

The key features emerge more clearly in the cumulative chart (note the interpretation panel under the legend):

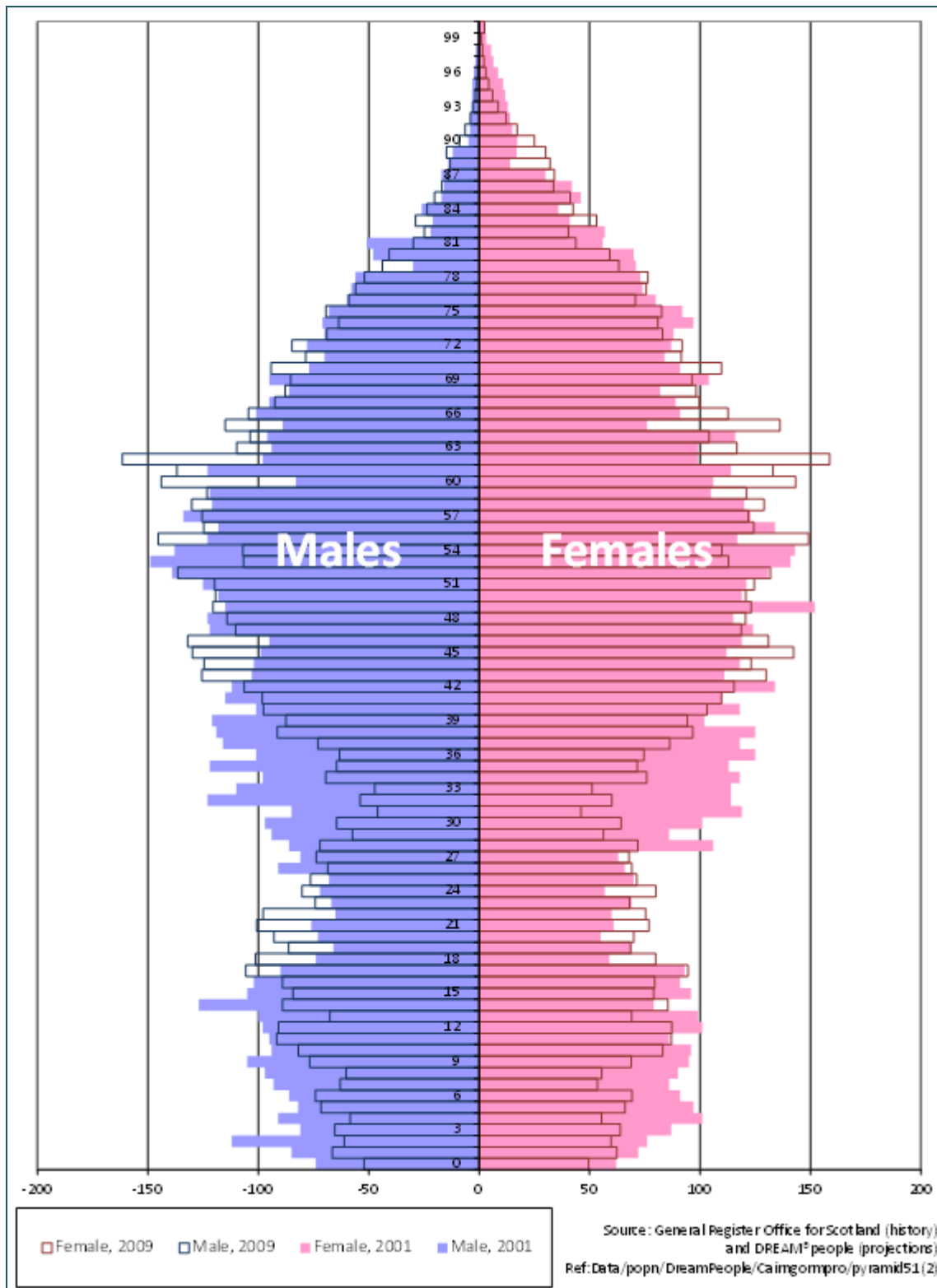
Figure 4.14 Cumulative net migration chart by age



B. Population projections and impact on workforce

The impact of this on the overall distribution over seven years has been significantly to reduce the human capital in the Park, almost halving the number of people in their thirties.

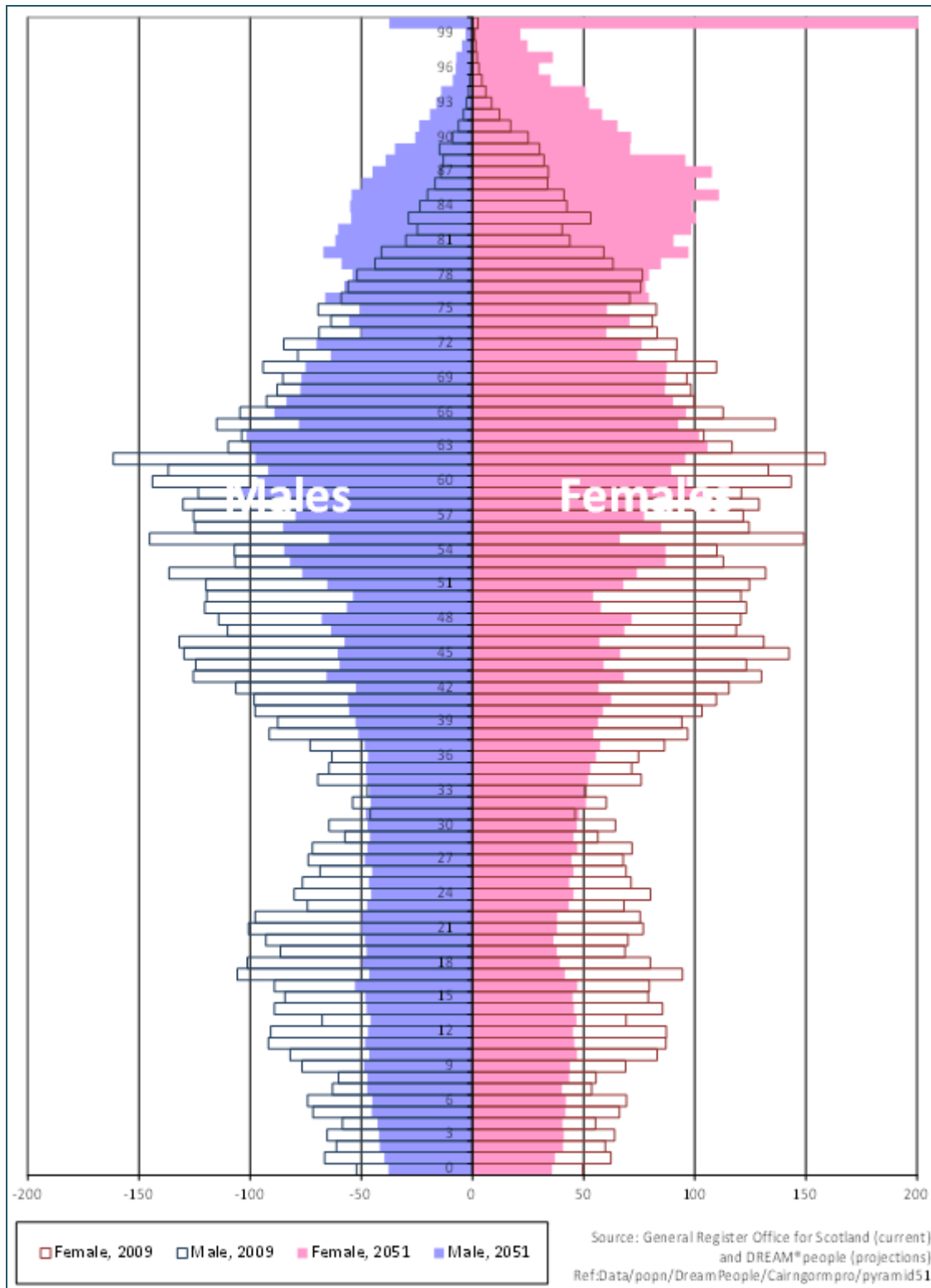
Figure 4.15 Age distribution in the LLTNP (2001-2009): the age distribution has changed



We have done a simple projection, based on the assumption that recent trends continue and that migration rates in each of the key groups remain the same. In 40 years' time this leaves an age distribution which is clearly problematic.

This *purely conditional* projection shows big decreases in all ages up to 75, and big increases in all ages over 75.

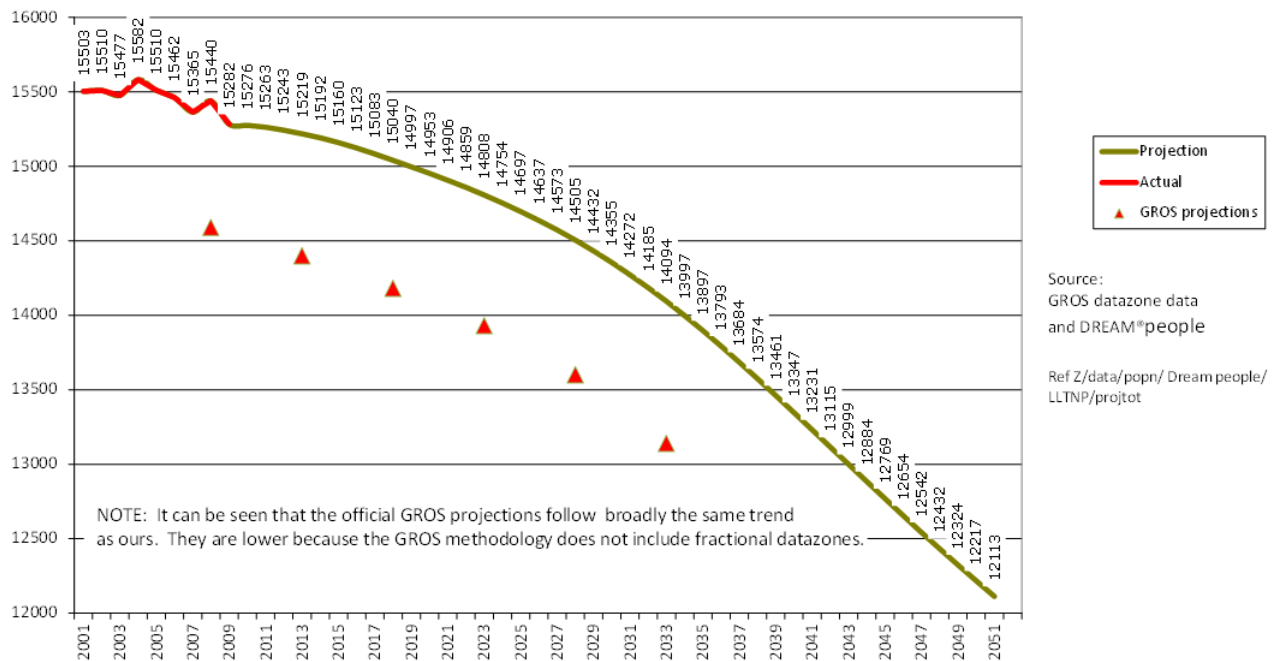
Figure 4.16 Age distribution future trends in the LLTNP (2009-2051): if present trends continue the demography of the National Park becomes a severe problem



It also shows a significant overall decline in population, with the logic of the model causing that to happen at an accelerating rate.

In the chart below we have also included the official projected population from the General Register Office for Scotland. This starts from a lower figure, because the GROS population estimates are based on 'best fit' using whole data zones, whereas the LLTNP's apportionment system includes a significant number of fractions of zones, and so comes to a higher figure.

Figure 4.17 Conditional 40-year population projection in the LLTNP if present trend continues

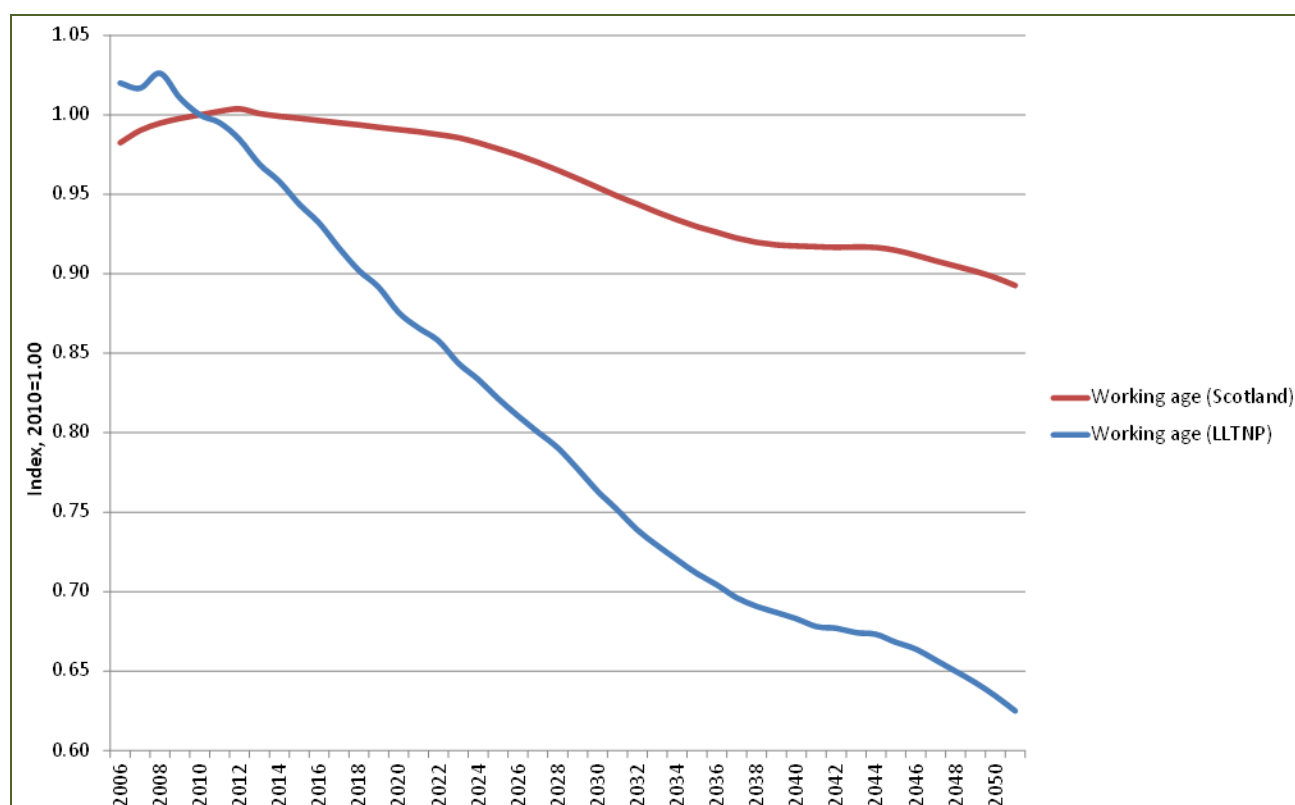


The past decline continues much as before until 2020 in this projection, but then begins to accelerate. This projection would be hard to tolerate, and certainly cuts across the Park's fourth objective as it is certainly not a sustaining community. A particular problem with it is the decline in the population of working age.

4.3.2 Commuting and workforce

There are currently (2010) 9,900 people of working age living in the Park. As in Scotland, this number is expected to decline, but the current pattern of migration to LLTNP, if maintained, would lead to a much steeper decline in the Park's population, over forty years by more than a third. This should be compared with a ten per cent decline expected using similar methods for Scotland as a whole, which is itself seen as a policy problem of significant magnitude. (This is in part because in simple total terms it is the opposite of trends in the South of England, where in-migration is an issue with a very strong influence on UK politics and policy). It is appropriate to emphasise again that these are projections if present trends continue, and should be seen as the first stage of an analytical and planning process, rather than an expected outcome.

Figure 4.18 Projections of working-age population to 2050 - LLTNP and Scotland



A. In and out-commuters

Many of the people who live in the Park work elsewhere, and many of the jobs in the Park are filled by non-residents. Unfortunately, for small areas the only source suitable for commuting analysis is the Census. The table below summarises the figures from the last available Census and the commuting flows behind them. These were based on a partitioning of Census Output Areas to estimate the National Park, rather than our normal partitioning of data zones.

Table 4.8 Commuting in the National Park 2001

Living and in working in the LLTNP	3,829
Out-commuting from the LLTNP	3,440
Total LLTNP residents in employment	7,269
In-commuting to the LLTNP	1,731
Total employment in the LLTNP	5,662
Net commuting	1,607

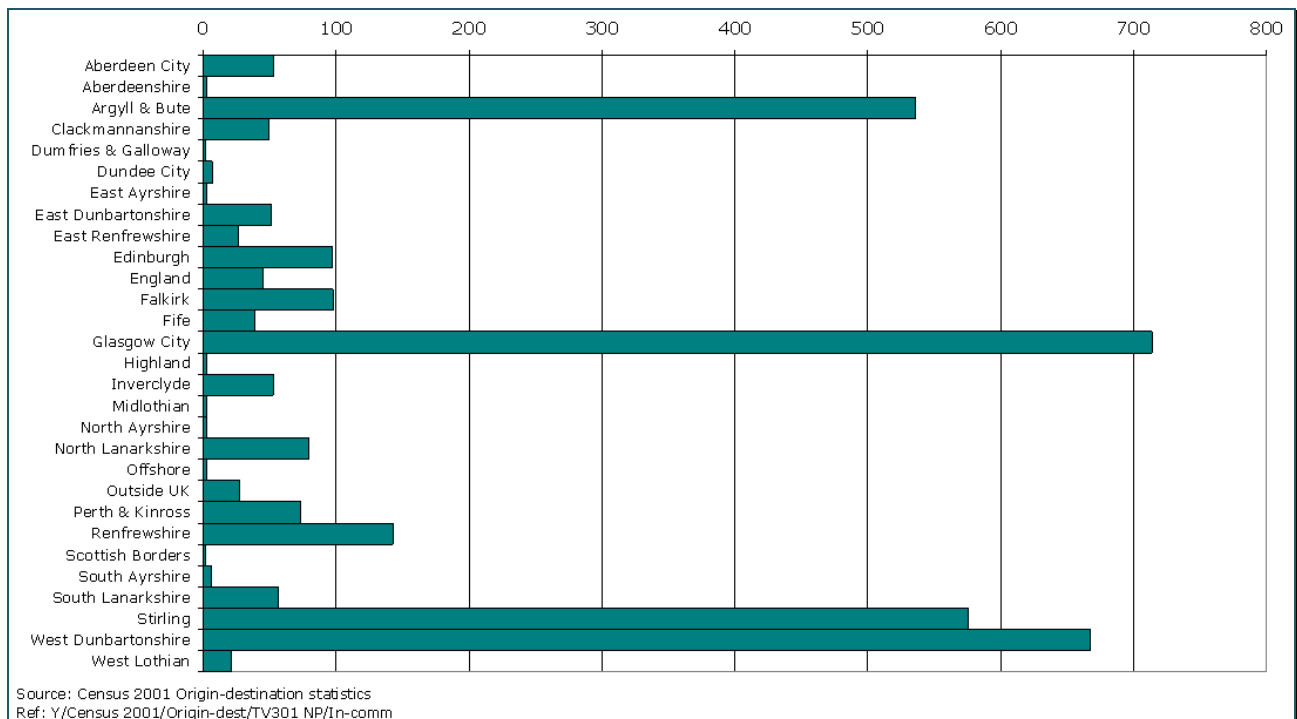
Source: Census 2001 Origin-destination statistics
Ref: Y/Census 2001CD/orig-dest/TV301 NP/tab⁹

It can be seen that of the 7,300 residents of the National Park who were in employment, almost half (47 per cent) out-commuted to work. With over 1,700 non-residents of the National Park in employment there, a net figure of 1,600 more people commute out than commute in.

There is no net inflow of commuters from any Council area, but although large numbers of people out-commute from the Park to the surrounding council areas, from these places there are significant inflows as well, so the exodus is partially offset. However, Glasgow attracts the largest number of out-commuters, over 700, and only 50 people commute in from the city, so a net figure of 650 people commute from the National Park to Glasgow.

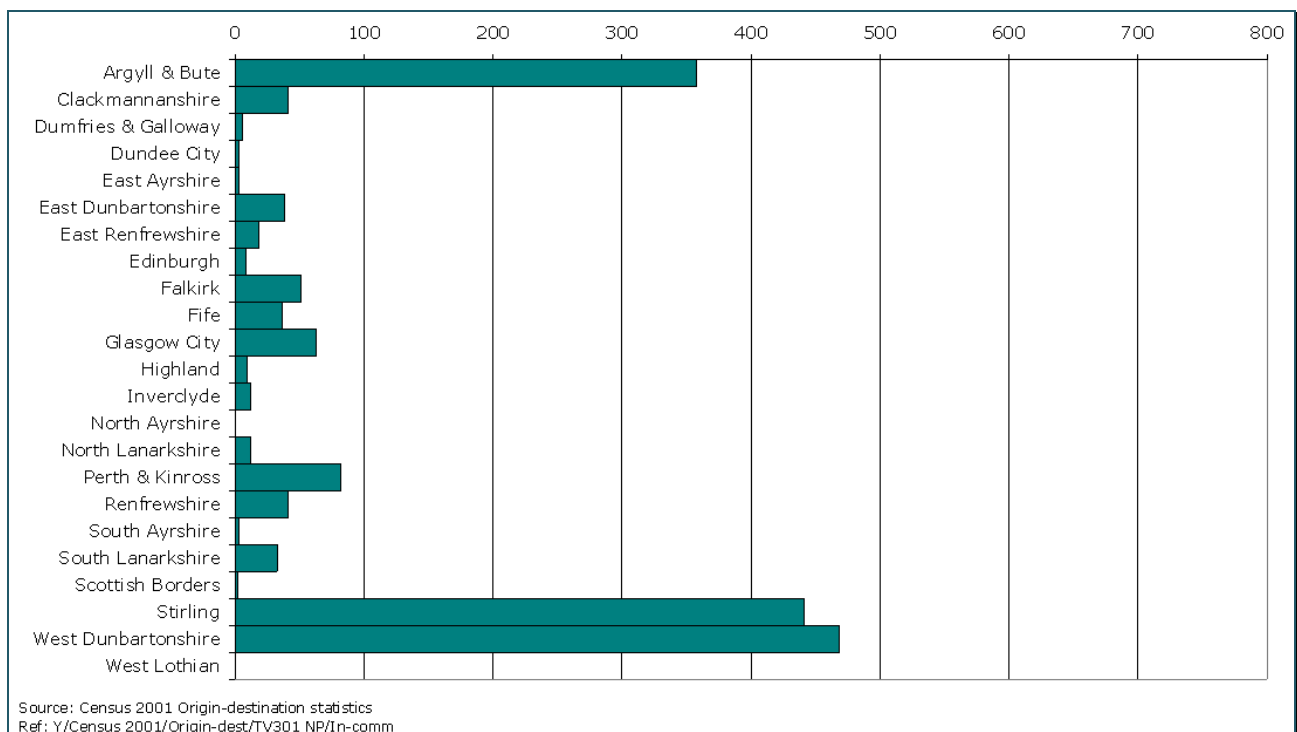
⁹ The first of the Census 2001 origin-destination statistics were released on 7th May 2004. Included in this release was table TV301 which showed travel to work/study flows between all Census Output Areas in Scotland and from which the data shown has been drawn up. WEW estimate from this that data based on Census 2011 will be available in mid 2014.

Figure 4.19 Destination of out-commuters from the LLTNP



The graph below shows, as would be expected, that the great majority (73 per cent) of the 1,700 in-commuters to the National Park come from the three dominant council areas. Argyll and Bute sends 21 per cent, West Dunbartonshire 27 per cent, and Stirling 26 per cent. Next is Perth and Kinross with 5 per cent.

Figure 4.20 Origin of in-commuters to the LLTNP



B. Estimates of commuting by industry and occupation

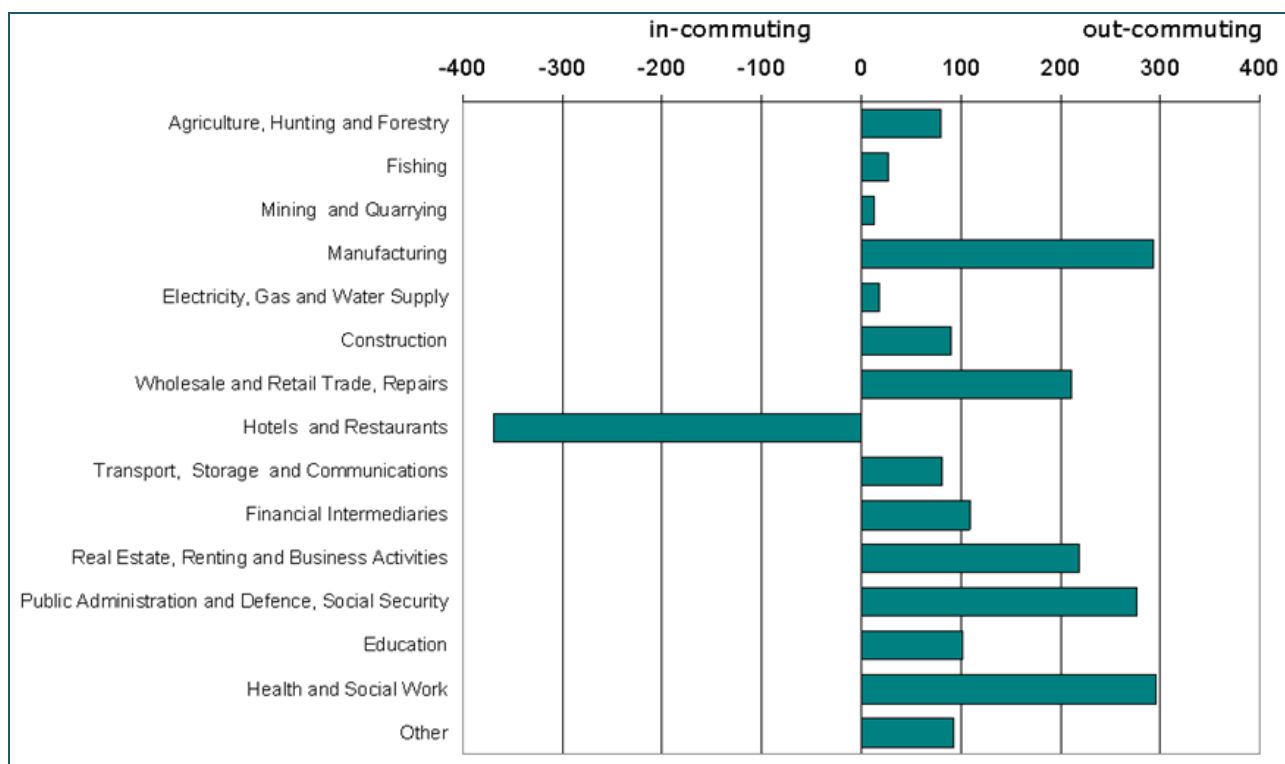
It was found possible to calculate an estimate of the net flows by industry and occupation. These calculations were based on 'employee-job' figures and therefore include work which is not people's principal occupation.

The main steps in the arithmetic are as follows (numbers are rounded):

- There were 5,000 jobs reported by the Annual Business Inquiry in Census year 2001 (4,500 jobs in 2002¹⁰)
- If the self-employment figure from the Census (1720) is added this gives 6,720 job slots. If an allowance is made, industry-by-industry, for jobs which are not people's principal job the total number of people to fill the employee slots would be 3,400 to 3,800, based on Scottish rates.
- From the number of residents who are employees we can deduce that a net figure of 1,500 to 2,000 more people commute out than commute in. This corresponds well with the 'origin and destination' Census figure of 1,607.

The figures in the chart below suggest that there is net out-commuting across all industries in the Park apart from hotels and catering which has a net in-commuting figure of 300. Manufacturing industries and health and social work have the highest net outflow of commuters, just under 300 people.

Figure 4.21 Estimated net commuting by industry (based on ABI2001 and Census)



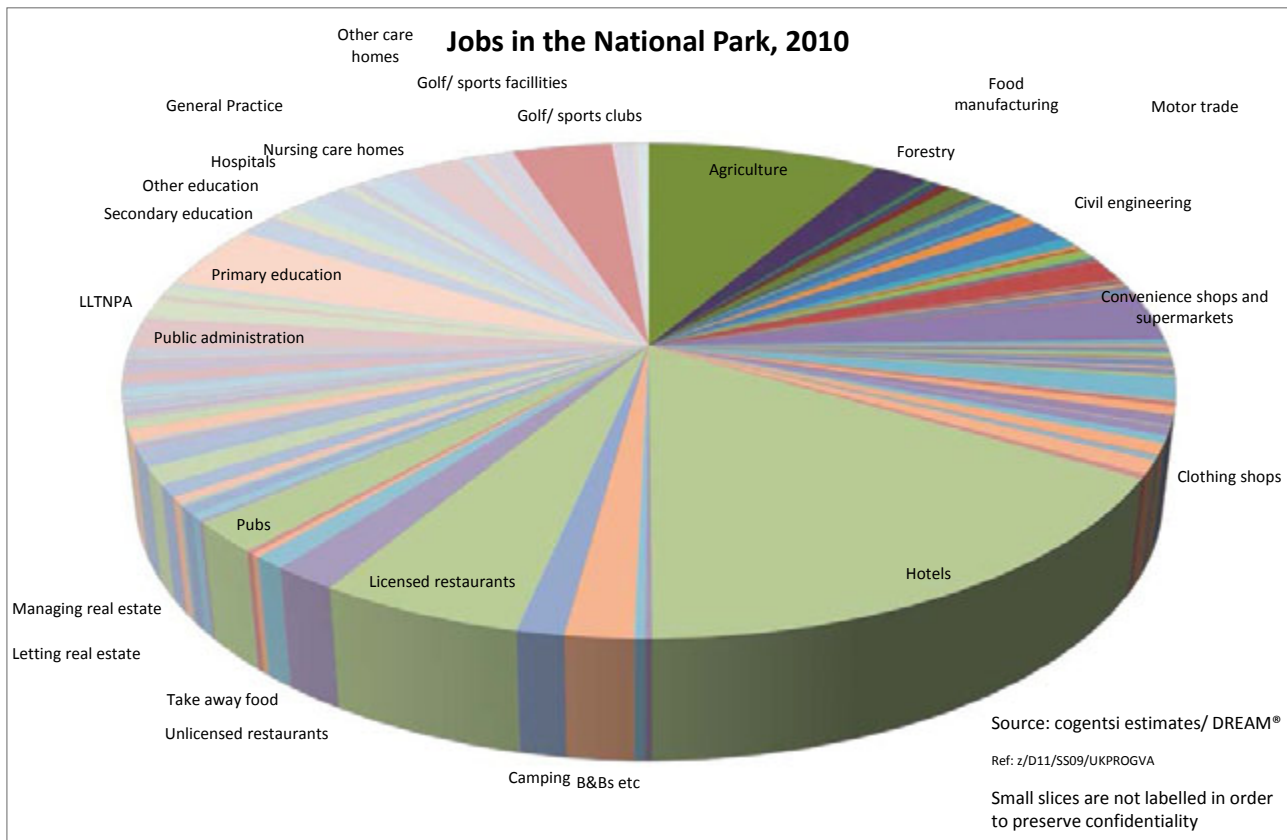
4.3.3 Employment by industry

Some 70 per cent of working-age people in the Park have jobs. In the Census year 2001 this totalled 7270, of whom almost half commuted to work elsewhere. There were then 5660 jobs in the Park, of which nearly a third were filled by in-commuters. Now there are 6340 jobs in nearly two hundred identifiable industries (classified to the five-digit level of the Standard Industrial Classification).

More than a third of these are in the hospitality sector, about a sixth in tourism-focused retailing and recreation services, and a good number in specialised transport like pleasure boating. Thus well over half the jobs are founded in the Park's special natural environment. A sixth of jobs is also directly on the land in agriculture and forestry. **This means that two thirds of the Park's jobs can be considered to relate to its natural assets.**

¹⁰ The Annual Business Inquiry identified 4500 jobs in 2002 and 5000 in 2001. However, the difference was primarily due to a measurement error.

Figure 4.22 Employment by industry



4.3.4 Unemployment

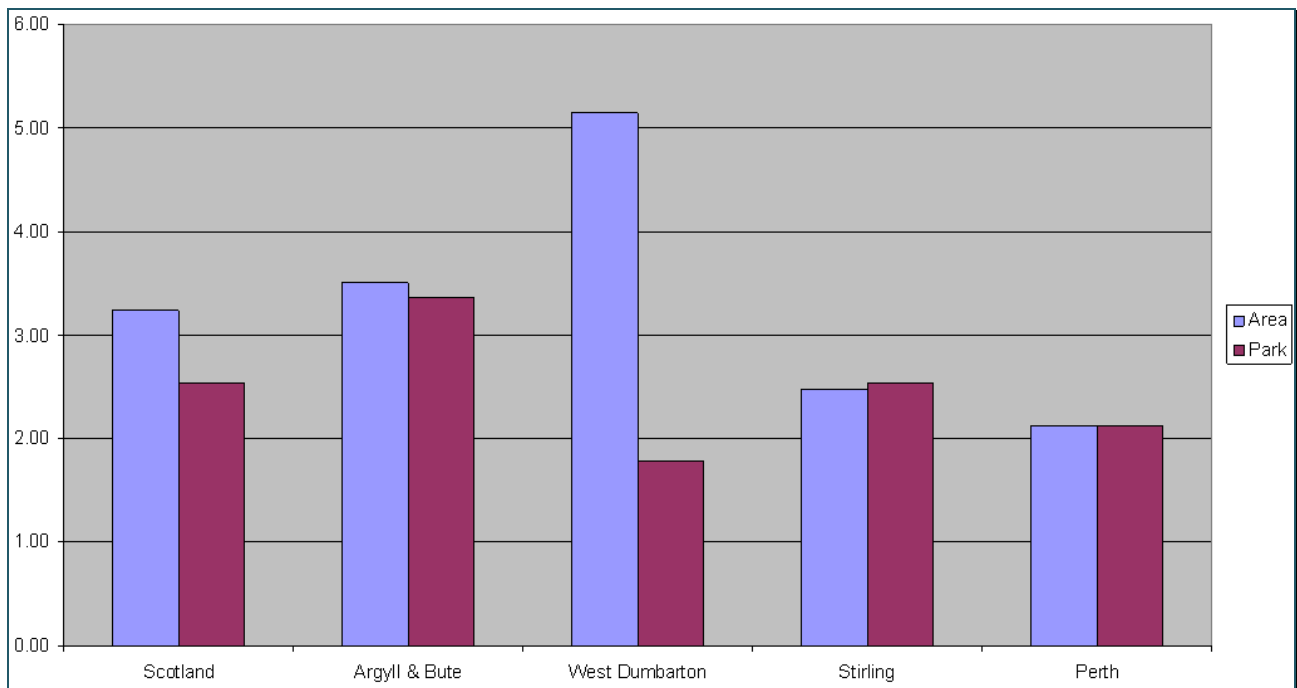
The latest number of claimants of the Job Seekers Allowance for residents in the Park is 239, with the area distribution shown in Table 4.9.

Table 4.9 Job Seekers in the LLTNP

Area	Number of job seekers
Argyll & Bute Park	66
West Dunbartonshire Park	36
Stirling Park	134
Perth Park	3
Total LLTNP	239

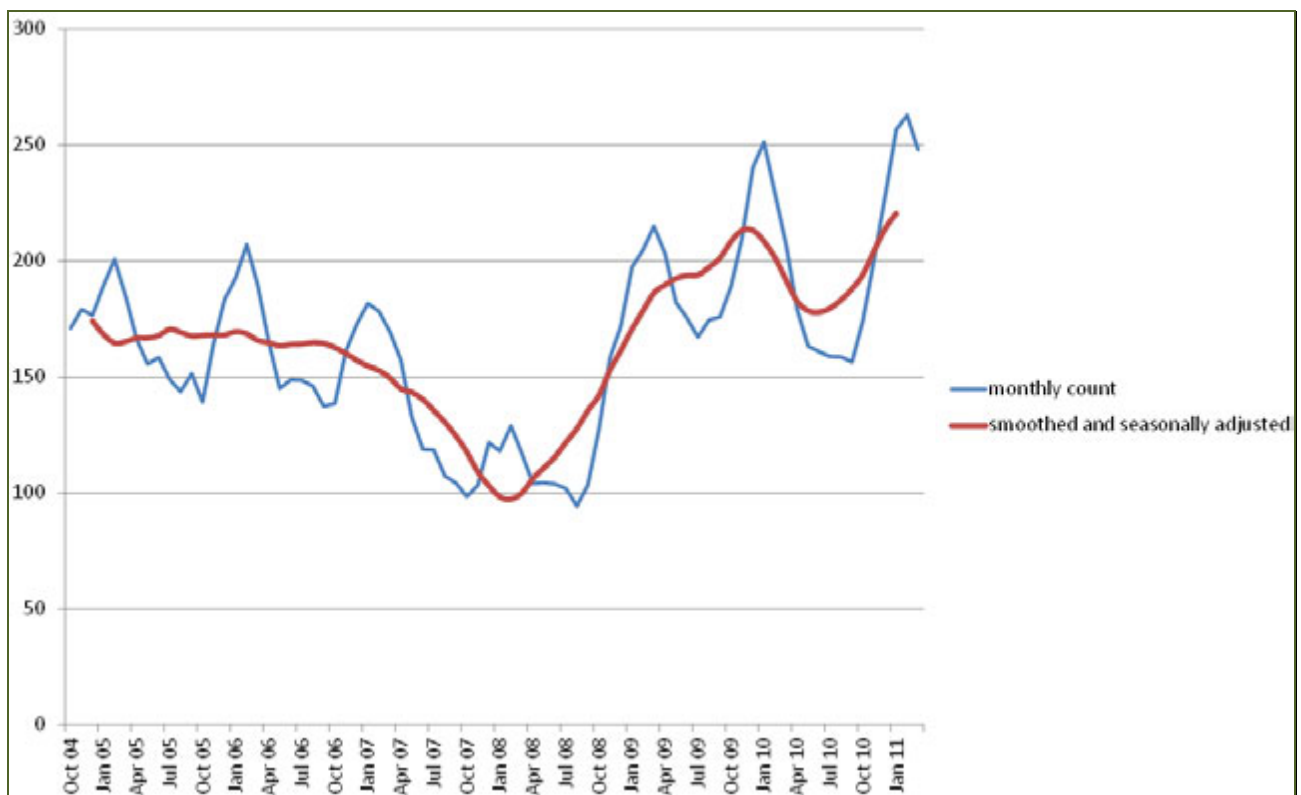
As is well known the claimant count may be a considerable underestimate of the number seeking work, especially now that unemployment has been rising for three years, but it is an off season count and jobs will be easier to find in the summer period. As might be expected unemployment is less of a problem in the Park than in the areas surrounding it and in Scotland as a whole. This is shown in Figure 4.23.

Figure 4.23 Jobseekers as a percentage of the working population in the Park and adjoining areas



The unemployment rate dipped as low as one per cent in 2008, in what appears to have been a quite severely overheated labour market, but the trend in unemployment in the Park has been broadly upwards since the onset of recession, albeit that it may have stabilised in early 2011.

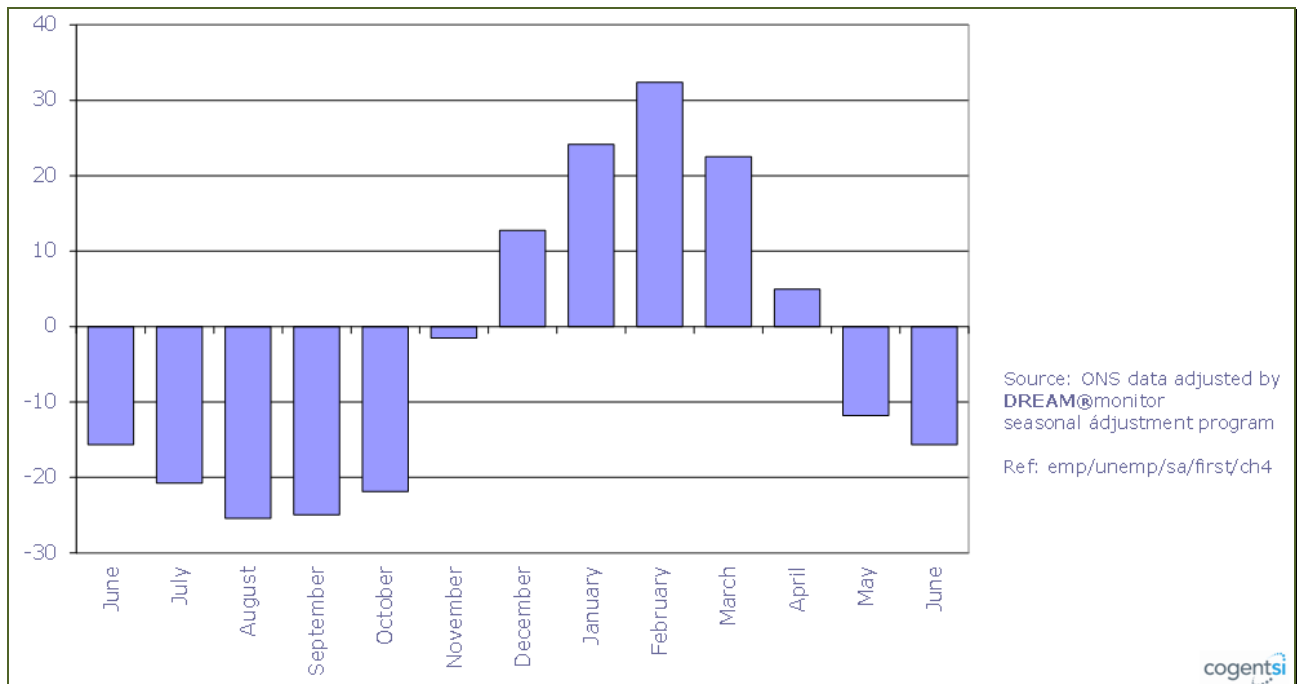
Figure 4.24 Claimant unemployment in LLTNP- monthly figures 2004-2011 and the underlying trend



The seasonal pattern is also clearly illustrated in this figure. Unemployment reaches its lower level in August, when the number of claimants is typically 25 below trend, and its highest level in February, when it is typically 32 above trend. In timing this is, of course, the inverse of the seasonal pattern of business in the Park (and as such corresponds with the seasonal pattern of traffic flows), but the amplitude of the cycle, less than one per cent of the labour force, is very much damped. This is likely to be due to a combination of two factors: firstly that of employers holding on to

employees ('hoarding' is the technical term) even when business is slack, either to do scheduled non-visitor-facing tasks, or because retaining the employees is less costly in social, financial and training terms than letting them go and hiring anew next season, and secondly the fact that seasonal jobs may be amongst those most likely to be filled by in-commuters, so the seasonal pattern of employment in the Park will not show up fully in the unemployment of Park residents.

Figure 4.25 The seasonal swings in unemployment amongst Park residents



4.4 Cultural assets

4.4.1 Visitor information centres

VisitScotland manages a number of visitor information centres within the National Park with the task of providing visitors with tourist information on the area's activities, amenities and facilities.

These are:

[Aberfoyle - Trossachs Discovery Centre](#), Aberfoyle

[Callander VisitScotland Information Centre](#), Callander

[Tarbet VisitScotland Information Ctr.\(Loch Lomond\)](#), Tarbet

[Tyndrum VisitScotland Information Centre](#), Tyndrum

[Balloch VisitScotland Information Centre](#), Balloch

In addition, some of the National Park Centres also provide information on the local area. These are however included in the following section.

4.4.2 Manned visitor attractions

A number of tourist attractions are located within the Park, enabling visitors to explore and experience the National Park's landscape, culture and nature:

- Balmaha Nature Cruises
- Balmaha Visitor Centre
- Benmore Botanic Garden (also known as Younger Botanic Garden)
- Breadalbane Folklore Centre
- Cruise Loch Lomond

- David Marshall Lodge
- Hamilton Toy Collection
- Inchmahome Priory
- Kilmun Arboretum
- Loch Lomond Sea Life Aquarium
- Loch Lomond Seaplanes
- Moirlannich Longhouse
- Purdies at Luss
- Scottish Wool Centre
- SS Sir Walter Scott & Lady of the Lake
- Sweeney's Cruises
- The National Park Gateway
- Trossachs Woollen Mill

4.4.3 Golf courses

There are eight golf courses located within the National Park boundaries.

The table below illustrates the eight courses, along with the type of course and green fee rounds obtained from individual websites (where available) during the month of January 2011.

Table 4.10 Golf courses in the LLTNP

Golf Course	Type	Postcode	Visitor Round £ -Peak*	Visitor Round £ -Non Peak*	Number of holes
The Carrick at Cameron House	Commercial	G83 8QZ	£125.00	£75.00	18
Aberfoyle Golf Club	Commercial	FK8 3UY	£22.50	£22.50	18
Buchanan Castle Golf Club	Private Members	G63 OHY	£44.50	£22.00	18
The "Wee Demon" at Cameron House	Commercial	G83 8QZ	£15.00	£10.00	9
Strathendrick Golf Club	Commercial	G63 0BD	£15.00	£10.00	9
Loch Lomond Golf Club	Private Members	G83 8NT			18
Callander Golf Club	Commercial	FK17 8EN	£30.00	£30.00	18
Ross Priory	Private Members	G83 8NL			9

** some golf courses advertise a week-day vs week-end round fee. When this is the case, an average of the two figures was used.*

4.4.4 Listed buildings

Both the ancient history and more recent times are reflected in the buildings that have been selected for listing, either by the Park Authority or its predecessors.

Listed buildings are designated for their special architectural and historical interest, and thus by definition have a value in addition to their value in normal daily use. To merit designation the property must satisfy set criteria, prepared by Historic Scotland, which distinguishes their significance. The criteria by which the Scottish Ministers define the necessary quality and character under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 are broadly: age and rarity; architectural interest, and close historical association. These criteria provide a framework within which professional judgement is exercised in reaching individual decisions. It is rarely one factor alone which qualifies a subject for designation but rather a combination of many.

There are 563 buildings or structures listed in the National Park and they range from castles to small cottages and piers to aqueducts. The National Park Authority holds the list of buildings and structures which are scheduled or listed within the National Park.

4.4.5 Other attractions

The National Park is peppered with ruins/monuments, viewpoints and picnic sites as well as being host to a variety of nature and wildlife trails. The latter three are identified in Figure 4.26 and Figure 4.27.

- Ruins/monuments:
 - Inch Talla Castle (Lake of Menteith)
 - Carrick Castle
 - Bannachra Castle

Figure 4.26 Picnic sites and viewpoints in the LLTNP

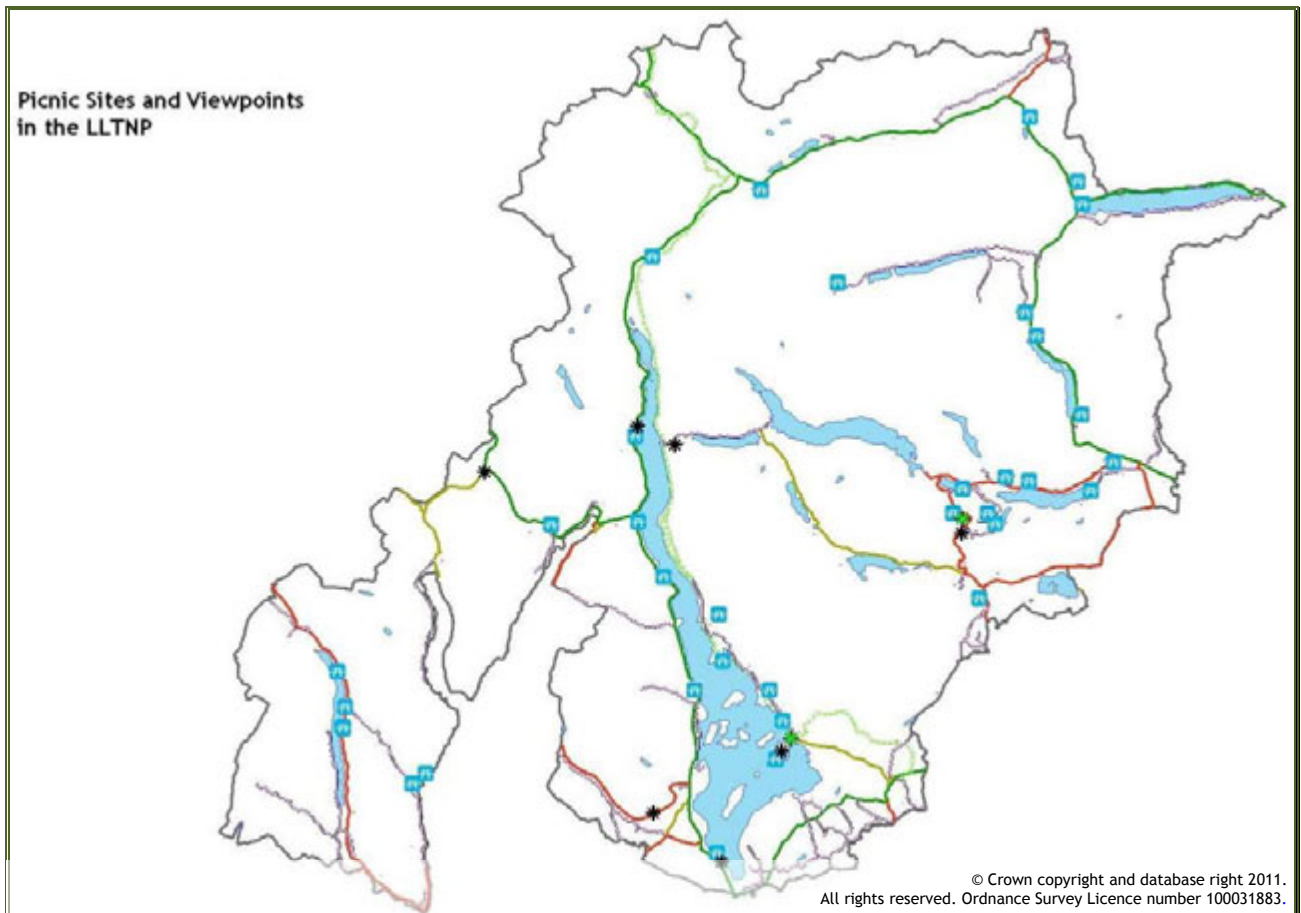
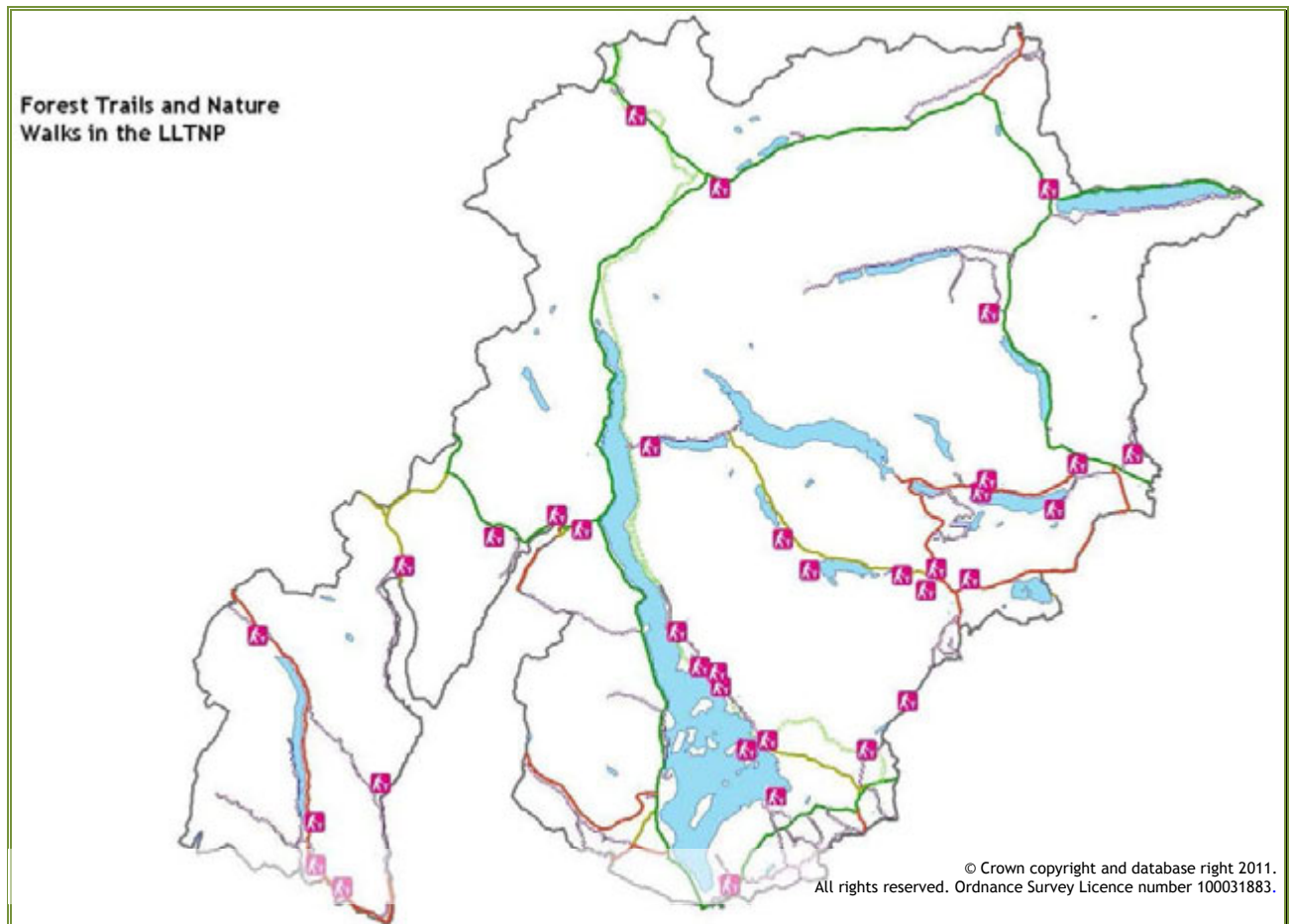


Figure 4.27 Nature or forest trails in the LLTNP



Footpath work undertaken in the Argyll Forest Park is shown in the following table.

Table 4.11 Footpath work in the Argyll Forest Park

Area	Path Name	New Path (meters)	Path Upgrade (meters)	ATV (meters)	New Bridges
Ardgarten	Succoth	980			
	Cobbler ATV			525	
	Cobbler 1 st Hill		652		
	Cobbler F1		1,034		
	Cobbler D3		413		
	Cycle Link	1,104			
	Stuc Beag	592			
	Glen Donich	3,663			
	Dukes Path	5,043			
	Ben Donich	415			
Glenbranter	Fire Tower			3,100	
	Glenshellish Mast			1,106	
	Am Binnean			705	
	Lauder Llnk	75			
	Ritual Grove	640			
	Downhill Mountain Bike Section 1	595			
	Downhill Mountain Bike Section 2	216			
Lochgoilhead	Lochgoil Cycle Path	533			
	Lochgoilhead Arboretum		610		

Area	Path Name	New Path (meters)	Path Upgrade (meters)	ATV (meters)	New Bridges
Ardentinny	Knap Burn	856		1,459	
	Knap Burn ATV				
	Shepherds Point	222			
	Riverside	424			
	Estuary Walk	585			
	Lairds Grave	400			
	Drynain	220			
Kilmun, Benmore & Pucks Glen	Arboretum		4,800	577	9
	Office	64			
	Pucks Glen	220			
	Pucks Glen ATV				
	Hide Path	335			
	Eckford House	436			
	Tree Room	256			
	Black Gates				
Loch Eck	Inverchapel	1,592			
	Inverchapel View Point	1,480			
	Larach Cycle Link	160			
	Glen Eck	960			
Grand Total		22,066	7,509	7,532	9

Over 27km of new, upgraded or rebuilt sections of track/path are recorded.

Over the last decade the Park Authority has also invested quite significant sums into building and upgrading relatively short but very popular trails such as the Quarry Trail at Luss. Table 4.12 shows the capital work undertaken over the last four years.

Table 4.12 Capital path works undertaken by the National Park Authority

Output	Financial year end 2010/11	Financial year end 2009/10	Financial year end 2008/09	Financial year end 2007/08
Capital path works	£67,547	£98,767	£135,340	£28,000
Projects	Bracklinn Path, Manse Bay, Gairletter Link Path	Bracklinn Falls Bridge, Torrie Forest Link, Wee Wood Path, Carrick Castle to Ardentinn Path	Glen Ample Path, Strathyre Bridge Link	Buchlyvie / Cobleland Railway Bridge, Mid Balvaig Path Tyndrum - Crianlarich Cycle Path Feasibility, Inchcailloch Boardwalk NCN7 Signage
Matched funding	£0	£96,858	£20,220	£134,000
Total	£67,547	£195,625	£155,560	£162,000

Together with work undertaken in the Queen Elizabeth Forest Park the total is close to 100km of work. Because so much of this work is in the most difficult of terrain and often involves bridging streams, costs will not be dissimilar to those for unclassified but hard surfaced roads of £9,400 per km.

The database of the Core Path network is a data source that is available but time constraints have limited use. It is recommended that it is incorporated in this list when resources allow.

4.4.6 Events and festivals

A number of events and festivals, from 5K runs to highland games to music festivals are organised throughout the year within the National Park area. These are detailed in the table below.

Table 4.13 Events and festivals taking place within LLTNP

Festival/Event Name	Town(s)	Time of year	Details	Website
Aberfoyle Mushroom Festival	Aberfoyle, Trossachs	Thursday 21st October 2010 to Sunday 24th October 2010	Range of events organised around mushrooms; 2010: 'Hong Kong' theme and special related events (e.g. with dragon boat racing, Chinese banquet lion dancers).	www.mushroomfestival.co.uk
Beer Festival	Aberfoyle	Friday 26th November 2010 to Sunday 28th November 2010		
Callander Jazz and Blues Festival	Callander	Friday 30th September 2011 to Sunday 2nd October 2011		www.callanderjazz.com
Callander World Highland Games	Callander	Friday 30th September 2011 to Sunday 2nd October 2011		www.callanderhighlandgames.co.uk
Cashel Race	Balmaha	Sunday 19th September 2010	8km race	
Chloe McIntyre 5K Fun Run & McLaren RFC fun day Callander	Callander	Saturday 14th August 2010		
Inchcailloch Festival	Balmaha	Saturday 4th September 2010 to Sunday 5th September 2010		
Killin Games	Killin	Wednesday 3rd August 2011		www.killingames.co.uk
Loch Earn Swim	Loch Earn	Saturday 12th September 2009 to Saturday 12th September 2009		
Loch Lomond Food & Drink Festival	Loch Lomond Shores, Balloch	Saturday 18th September 2010 to Sunday 19th September 2010		www.lochlomondfoodanddrinkfestival.co.uk/website_08/2008/index.html
Lochearn Shears	Lochearnhead	Saturday 2nd July 2011 to Sunday 3rd July 2011		
Lochearnhead, Strathyre & Balquhidder Highland Games	Lochearnhead	Saturday 23rd July 2011		www.lochearnheadhighlandgames.co.uk
Lomond Folk Festival	Balloch	Friday 29th July 2011 to Saturday 30th July 2011	festival may not run in 2011 due to financial losses	www.lomondfolkfestival.com
Luss Highland Games	Luss	Saturday 2nd July 2011		www.lusshighlandgames.co.uk
Plod Trossachs	Aberfoyle	Saturday 3rd September 2011	50km trek gets near Aberfoyle at midnight. The circular hike takes participants through tracks, paths and glens, along rivers and burns, past mountains and lochs including, Loch Drunkie, Loch Achray and Loch Venachar, through the village of Brig-o-Turk and sections of the Rob Roy Way.	www.action.org.uk/plod_trossachs

Festival/Event Name	Town(s)	Time of year	Details	Website
Polaroid 5k Loch Lomond Fun Run	Starts & finishes from Loch Lomond Shores	Sunday 12th June 2011		
Rob Roy Highland Games	Kinlochard	Sunday 18th July 2010		
Rob Roy Way Challenge	Drymen to Kenmore via Aberfoyle, Callander & Balquhider	3 day event Saturday 18th June 2011	Teams or individuals will walk 16 miles from Drymen, near Loch Lomond, north-east through The Trossachs to Callander. They will then switch to bikes for a 39 mile cycle via Balquhider to Kenmore on the banks of Loch Tay.	www.robroychallenge.com/about/route
Scotland		Tuesday 1st June 2010 to Sunday 31st October 2010	2010: 44 events ranging from Ranger tours, candle lit evenings of recitals and song, Scott themed cruises on Loch Katrine, the publication of a new edition of the poem the Lady of the Lake to larger events such as the Edinburgh International Book Festival, the Kite Festival and The Chase. Large number of events with legacy. 7,000 attendees across all activities (excluding Celtic Connections audience of 2,000 on January 2011). Average audience of 150 people per event - 6,600 audience	www.scottotland.co.uk
T4 Great Outdoor Festival	Aberfoyle, Gartmore, Kinlochard, the Trossachs	2010: end of March	T4 being Tramping Through The Trossachs	
The House Folk - Scottish Folk Concerts in Kinlochard in the Trossachs.	Kinlochard	Thursday 10th November 2011 to Saturday 12th November 2011		www.scottishmusicfestival.co.uk
Trossachs Classic Cars Run		Sunday 12th September 2010		
Trossachs Ton	Aberfoyle	Sunday 19th June 2011	100 m cycle route	

5 Catalogue of activities

This is the chapter where we set out what the Park does, and more particularly what people in it do as a set of activities.

The value flows relate to both standard business activities such as forestry, farming, hospitality, retail, education and activities such as hill walking or picnicking which have high value to the participants but little expenditure. Table 5.1 lists the activities considered.

Table 5.1 Activities in the National Park

Sector	Activity	Paid For
Forestry	Forest Planting	Yes (S)
	Forest Harvesting	Yes
Agriculture	Agriculture	Yes (S)
Energy	Energy	Yes (S)
Water	Water	Yes (S, No)
Retail	Retail	Yes
Housing	Housing	Yes (some S)
Public Authorities	Waste Disposal	No
	Education	No
	Local Transport	Yes (S)
	Transport Infrastructure	No
Recreation	Accommodation	Yes (if not VFR)
	Hospitality (Food/Drink)	Yes
	Country Sports	Yes/Partial
	Fishing	Yes/Partial
	Golf	Yes/Partial
	Attractions	Yes
	Water Trips	Yes
	Water Sports	No/Occasional
	Hill Walking	No/Occasional
	Cycling	No/Occasional
	Short Walks etc	No
	Bathing	No
	Fine arts, writing &c	Sometimes
	Performance	Usually
	Social, parties &c	Sometimes

In the next four chapters we have grouped these activities into four categories:

1. **“Export” goods and services.** This covers the productive industries such as agriculture, forestry, energy, water and miscellaneous manufacturing businesses.
2. **Visitor goods and services:** This category covers hospitality (part), recreational services, transport (part). Where significant, e.g. hospitality and recreation SIC classifications are subdivided.
3. **Local goods and services:** This category covers hospitality (part), transport (part), education, other public services.
4. **Global goods and services:** This category covers those services that benefit the general public in the UK and the rest of the world. We identify four major groups:
 - a) Conservation: The maintenance of rarely occurring flora, fauna and ecosystems whose existence may be highly significant in the future.
 - b) Carbon sequestration: The reduction of carbon production or, more positive, the capture of existing carbon, which may have high costs in future years.
 - c) Sustainable energy: The development of energy production methods that will not lead, in future, to acute energy shortage and associated high costs.
 - d) Public health: The general desire to increase the length of active useful life of the population.

For each major activity sector we try to identify

- a) Employment
- b) Output/revenue
- c) Value

6 Production of export goods and services

6.1 Export industries

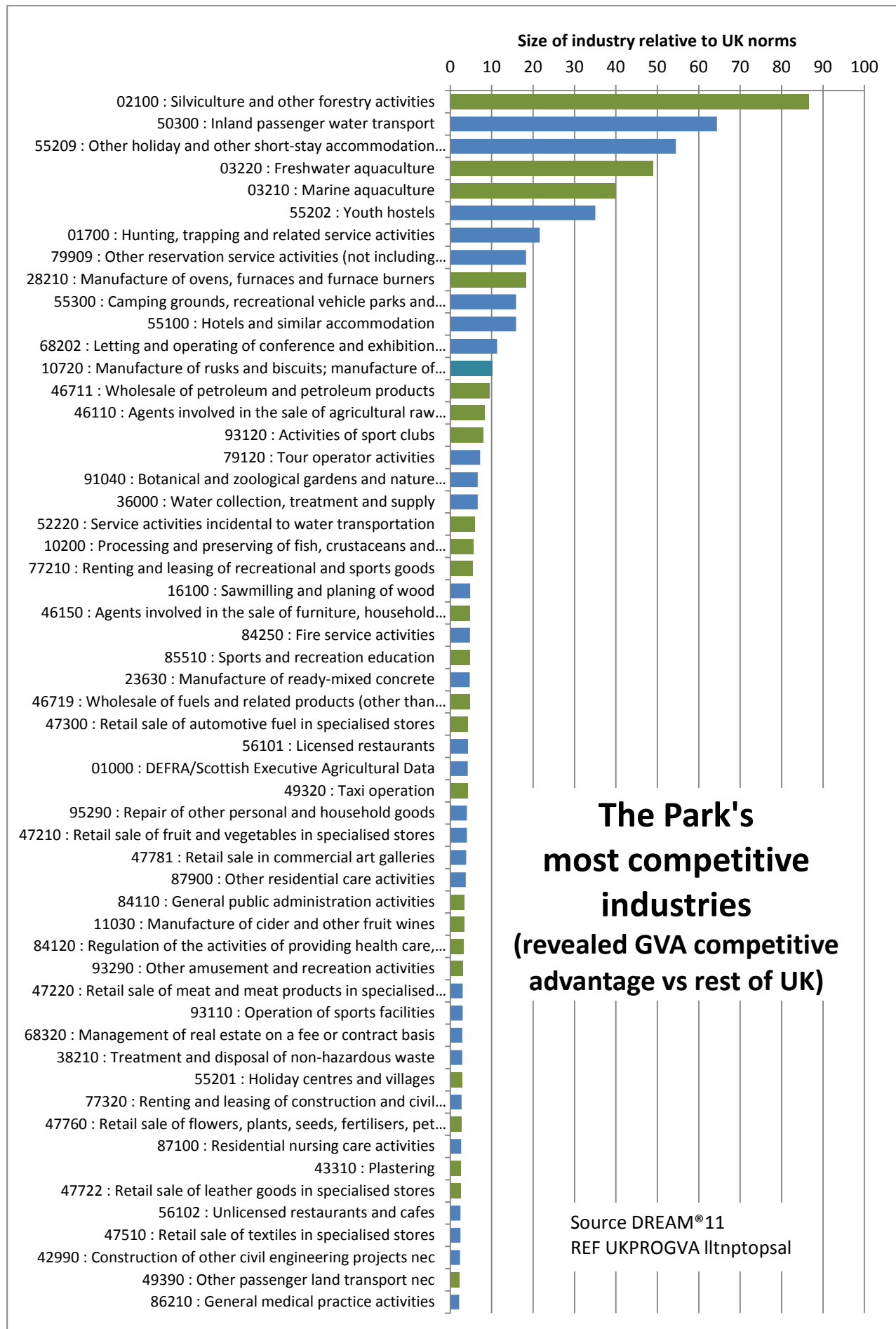
There are two ways in which the Park exports: by selling goods and services to those outside the park in their normal environment, and by selling to visitors.

In sorting out this distinction we have prepared charts based on the finest industrial classification available, the Standard Industrial Classification 2007 at 5-digit level. This classification breaks the entire UK economy down into 739 industries. Of these, 520 are absent from the Park. 128 are in the Park, but under-represented and 91 are over-represented. The first chart shows the 55 industries where the Park has twice as much economic activity as UK norms: 32 of these are tourism-related (shaded blue).

The above view of competitiveness has been based on value added. In a time of high unemployment alternative views of competitiveness have some weight, so for an employment-based view see Appendix 4.

Most of the export industries are land or water-related.

Figure 6.1 The Park's most competitive industries



6.2 Agriculture and food cluster

There are 350 farms in the Park, farmed by 200 separate occupiers, and covering an area of 1020 km². The great majority of the land is 'less favoured' rough grazing, conducive to extensive sheep farming, although the number of sheep has been declining from a peak of 165,000. There are about one tenth as many cattle. The total workforce is some 540, with a further 100 employed in supporting agricultural services and hunting and estate activities.

The farms are significantly smaller in terms of area and workforce, and somewhat smaller in terms of stock numbers, than the Scottish average, because the Scottish average includes large farms on the plains of the South and East of Scotland.

Sales, and therefore the value stream, are estimated at £19m and the GVA at £7m.

£8m worth of sales and £3m of GVA are located in Callander at Campbell's Shortbread, a 180-year-old family firm that focuses on the gift and seasonal market. *Although this business is one of only two remaining family shortbread firms in Scotland, and as well as the international trade supplies hospitality and retail businesses outwith the Park, it has been treated as part of the tourism cluster. The Park also has a small fruit wine business.*

6.3 The wood cluster

Mainly operated in the Park by Forest Enterprise, the forest industry has GVA (based on the ONS Regional Accounts) of £4.7m, and estimated purchases of £8.1m bring total industry revenue to £12.8m. However the purchases figure include £5m of trade with other forest owners and operators in and out of the Park, so less than half the £12.8m is represented by sales of timber for felling. (Standing timber currently fetches about £10 per m³)

There is value upstream and downstream from the forestry itself. Other significant inputs included in purchases include construction trades and logging contractors, and road haulage (which is the only significant transport industry based in the Park other than pleasure boats and marine transport support services). The timber cluster also includes sawmills and joinery producers, of relatively small scale but nevertheless selling about £2m of products and adding £750,000 GVA, and a small manufacturer of stoves with value added of about £0.5m.

Woodlands occupy almost exactly a quarter of the Park, 474 km², and this represents a little over 3.5 per cent of Scotland's 13,430 km² of forest, or 1.5 per cent of the UK's 28,460 km². The GVA estimated above is about 2.25 per cent of the 'factor income' of the UK forest.

The forest of course has significant recreational value enjoyed by visitors and residents. Most of the Park's forests are accessible, and so encourage both overnight visitors and non-stay recreational use, but even the less accessible ones in most cases enhance the scenery, not only encouraging visitors to come but encouraging entrepreneurs to provide visitor accommodation and sometimes recreation facilities.

Similarly, the forest adds significant value in terms of carbon sequestration. This is further explored in section 9.3.

6.4 Aquaculture

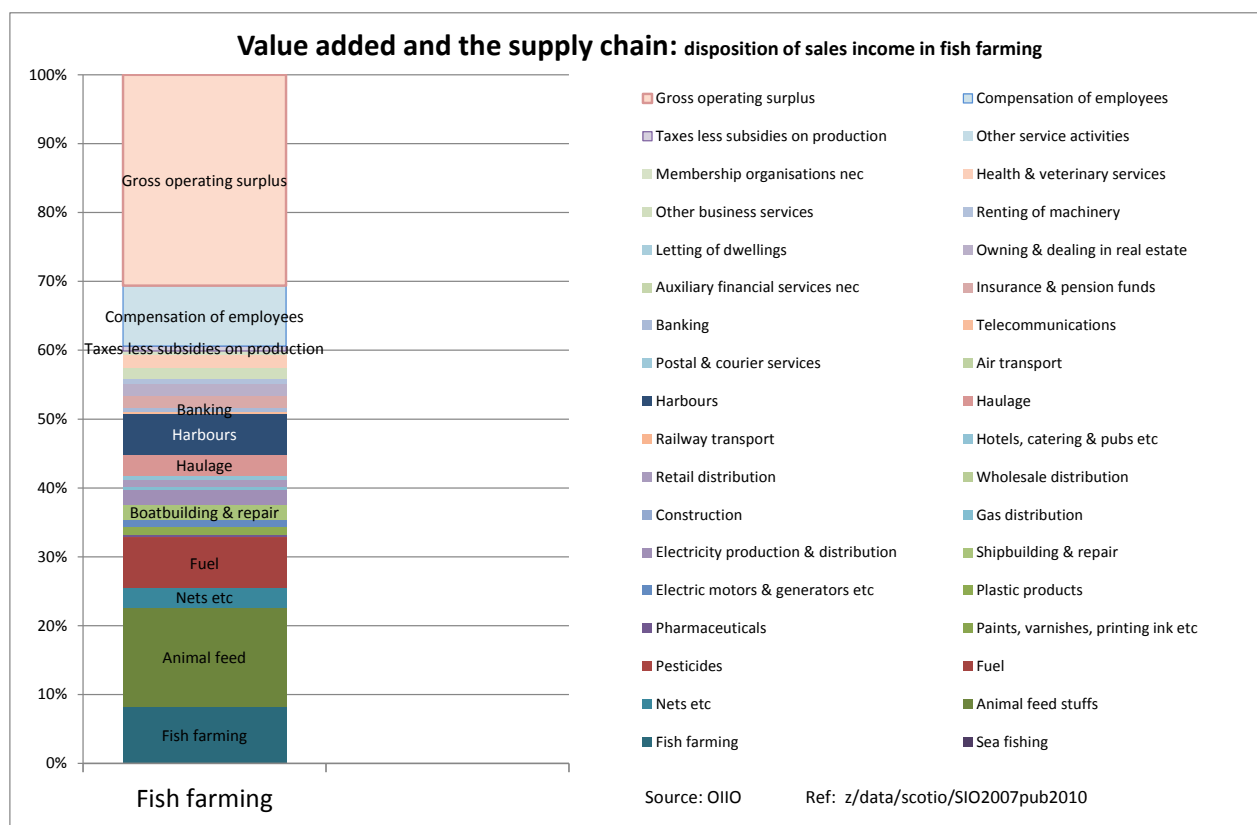
Fish farming takes place in Loch Earn (commercial fish farm), Lake of Menteith (cages for restocking), Loch Venacher (small fish farm) and Loch Fyne. **Together these represent value streams of over £4m and, with some £2.5m of purchases, a GVA of £1.5m.**

Marine aquaculture by definition cannot be carried out in the Park, which includes no sea, but the fish farming at the end of Loch Fyne is on the Park boundary. The Loch Fyne fishery, the associated large fish processing factory and associated catering are on the Park's boundaries and an allocation of only part of their (substantial) activity has been made, leading to a further £1.4m sales and £0.5m GVA. The catering and related services just outside the Park boundary are statistically allocated to the company's main activity.

The Business Register Employment Survey also includes some freshwater aquaculture in the Loch Eck, but it is not clear precisely what this very small activity refers to and it may be a statistical error.

The cost structure underlying the income stream is shown in the following figure.

Figure 6.2 The value chain in aquaculture



6.5 Electricity

One of the important ecosystem services provided from the Park is the generation of electricity. There are a number of small scale, mainly run-of-river, hydroelectric schemes, and the number is increasing as legislation and tariff conditions for renewable energy improve. A recent report (Forrest & Wallace, 2009) claimed that 350-1,400 jobs could be created in Scotland through small hydro developments (the majority of them construction jobs) and we infer from the geographical detail given in the report that about one sixth of them would be in the Park. However, in our judgement the very widespread development of small schemes is unlikely to fully achieve the potential that Forrest's hydrogeological model suggests.

By far the largest contributor to electricity generation, and the only substantial 'exporter', is the Loch Sloy power station on Loch Lomond side. Built from 1945 to 1950 as a peak supply station for Glasgow and Clydeside industry, and located between Loch Fyne, Loch Sloy and Loch Lomond, the scheme was the first hydro-electric development by the North of Scotland Hydro-Electric Board, now succeeded as Scottish and Southern Energy. The Allt na Lairige Dam was one of the first in Europe to use post-tensioned steel in the structure, thus reducing its thickness to only 60 per cent of that of a conventional gravity dam of the same height. A series of vertical steel rods near the upstream water face, stressed by jacks and securely anchored into the rock foundation, resists the overturning tendency of this more slender section. The scheme is the second largest of about 60 hydroelectric schemes operated by Scottish and Southern.

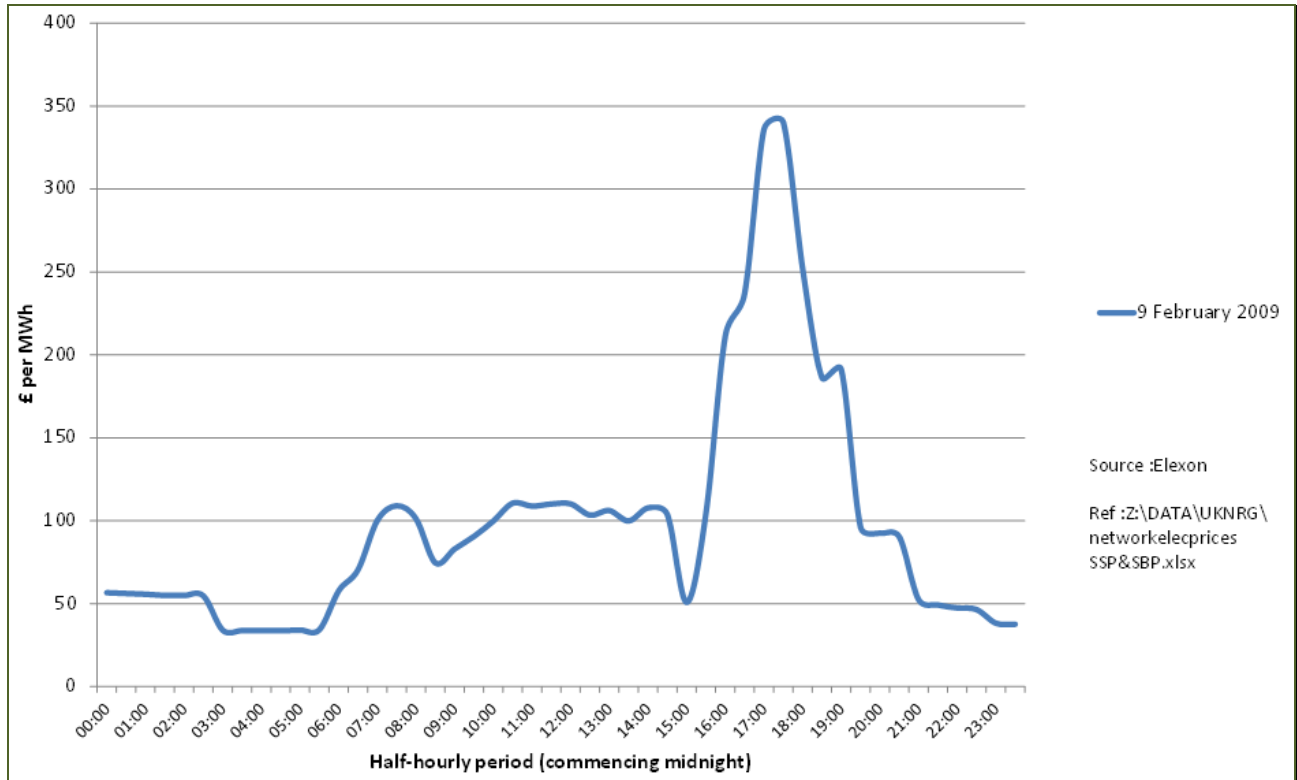
The catchment receives around 3 metres per year of rainfall, and the effective capacity of Loch Sloy is around 35m m³, allowing the station to operate currently as a conventional hydroelectric power source with a load factor of around 10 per cent (i.e. is called upon to operate for about 10 per cent of the time). The load factor may vary significantly, depending not only on the vagaries of electricity demand, but nowadays also on fluctuations in the availability of renewable power sources such as wind. In the management of the overall network in the present competitive regime it also depends on the price Scottish and Southern offer, relative to that offered by other peak-logging generators. The relatively low load factor at Loch Sloy (the UK average for hydro schemes is 35 per cent) reflects the fact that the resource is a precious one, saved because of its flexibility for times of peak use, and also the fact that the ability of Scotland to export electricity to England (where peak demand normally occurs) has been limited by the capacity of the interconnector cable across the border.

The head of water between the two lochs is 280 metres. One of the four generating trains still has its original capacity of 32.5 MW and the other three, expanded in the mid-1990s, are each 40 MW, leading to 152.5 MW overall, which at 10 per cent load yields just over 130 GWh per year. This would be valued at around £8.5m at normal wholesale electricity prices (as charged to large industrial users) of a little over 6p per unit (£6 per MWh).

However, Loch Sloy does not feed into the normal wholesale market, and although Scottish and Southern are not able to disclose details, the peak price is likely to be considerably higher, possibly four or five times as much.

The variations in the value of electricity are shown in the following chart, which shows the amount paid by the national grid as it fluctuated over a single cold winter's day. The price paid at the peak at 1800h when evening meals were being cooked and heating systems readied for the evening, equivalent to 37 p/KWh, was more than ten times the price of 3.4 p/KWh that the grid paid fourteen hours earlier when nearly everyone was asleep.

Figure 6.3 Diurnal variation of electricity prices: electricity prices vary through the day



In addition there is the value to society and the biosphere of avoiding using carbon-dioxide-emitting conventional power stations. At the relatively extreme assumption of the feed-in tariff, which is designed to reflect policy targets to reduce carbon emissions, the flexibility provided by the scheme would approximately treble the output's value.

To further derive value from the natural asset and the infrastructure, Scottish and Southern are currently installing pumps, so that water can be pumped up from Loch Lomond to Loch Sloy. This is expected to almost double the load factor. From a commercial viewpoint, the purpose of pumped storage is to take electricity from the grid when it is cheap (when demand is low or wind availability high), and put it back onto the grid when it is more valuable (when demand is high, or wind farms are becalmed). The facility will also be capable of being managed and operating on a seasonal basis, so in the event of a drought when Loch Sloy water levels were low, it would be possible to refill the reservoir from the more copious Loch Lomond with its much larger catchment area. The doubling of output in physical terms will not double the output in value terms, because the second tranche of power below the peak will not be priced so close to peak prices, but it will increase it substantially. The additional sales income will, however, be offset by the cost of using off-peak electricity to pump the water up, and the power losses involved in that (nationally these currently average around ten per cent, but in a new and reasonably large scale facility they should be lower.)

The flexibility of Loch Sloy already enables it to cream off the high prices payable around teatime, and the pumping facility will allow it to earn much more around the 6pm top, while utilising the power available at the 4am bottom.

The facility is unmanned, being operated from Perth, although a workforce of up to a dozen may be employed on maintenance and other tasks on SSE facilities in the area. Because no employment is formally reported for the site ONS do not include any value for the power output of this or any other hydro facility in the Park Area's contribution to GDP.

Again, the overall value figure appropriate to the CREA system is highly uncertain but a figure of £14m would fall towards the conservative end of the range from £8m to £30m per year. The £14m figure might increase to, say, £20m when the pumped storage system is operating. There are very few operating costs so almost all translates into GVA. If we were to include it, the carbon saving at marginal valuation would add a further £10-20m.

6.6 Water

Supplying sufficient quantities of good quality raw water for treatment and supply to a third of the country is one of the major ecosystem services provided by LLTNP. Loch Lomond is the largest expanse of freshwater in Great Britain with a surface area of 71 km² and a catchment of 696 km². Loch Katrine has an area of 10 km² and the Katrine and Glen Finglas catchment has an area of 154 km². The Loch Katrine water supply scheme promoted by Glasgow Corporation and opened by Queen Victoria in 1860 was considered the most ambitious civil engineering scheme undertaken in Europe since Roman times, and the engineering assets including the dams have listed status (and thus, implicitly, a significant 'existence value').

The supplies from the two catchments are jointly managed (Bramwell, 2008) to take account of water levels, weather forecasts, demand and occasional technical constraints. The demand supplied from the two catchments, 617 mld⁻¹, is 30 per cent of that supplied by Scottish Water, the public company that covers the whole country.

Valuation is potentially a matter for strong debate. The assets are old, unique, and it would certainly strain national construction resources to replace them. The human value of high quality drinkable water is substantial: the industrial value is far from negligible, and industries that need water really need it (Scottish Environment Protection Agency, Unknown date).

Scottish Water's revenue is just over £1bn per annum, and its value added, based on the charges made for its products¹¹, was about £0.5bn (Scottish Water, 2010). On this basis the annual economic value flowing from the water services of the Park is £340m. The balance sheet total of fixed assets for the corporation, formally calculated on a current cost convention, is £5.2bn. Deducting for wastewater activities this would leave the capital value of the assets entailed in water originating from the Park at about £1.2bn. The rate of investment by Scottish Water is expected to remain high for at least the next five years, but principally downstream in new distribution (Water Industry Commission for Scotland, 2009).

An alternative estimate would be based on the number of litres, which is 225m m³ per year. The 'true' cost of water according to publications from the England and Wales regulator is between £0.66 and £1.1 per m³ (our updating of their 2003-based figures), putting the value of the Park's production in the range £150- £250m per year.

These figures of hundreds of millions of pounds are not an upper limit of estimate. It is argued that the asset values ascribed to water companies in England and Wales, and to Scottish Water in its reorganisation, seriously undervalued historic assets and the cost of replacing them. This conclusion is certainly corroborated by the substantial increases in share prices recorded after privatisation in England and Wales, and the fact that profits went up despite significant increases in investment (Berg, 1997). Some polemicists have suggested that the replacement value of Scottish Water's assets would be around £50 billion - i.e. ten times the high estimates we have used (Cuthbert & Cuthbert, 2010).

In contrast, the value added allocated to the Park based on the regional accounts would be close to £7m, and the total value of production £10m. This is because the regional accounts use employment and salary indicators as the main basis of their allocation of output to regions and sub-regions. To make the contrast more piquant, around £360m of water gross output is allocated in the regional accounts to Fife, mainly because of the presence of Scottish Water's job-intensive headquarters in Dunfermline.

Our resolution of these relatively complex accounting issues is as follows:

- If the allocation of the nation's water value were based solely on created assets then the Park would 'attract', say, £250m
- If the allocation were based solely on employment it would attract £10m
- In the UK's water industry accounts then the split in value added share between capital and labour is 80:20
- We therefore allocate $0.8 \times 250 + 0.2 \times 10 = £202\text{m}$ to the annual value of the water produced from the Park.
- At a 4 per cent real return on an estimated £1.2bn built assets then these account for £48m per year
- Labour costs in the Park are approximately £2m per year and purchased services £9m
- Thus the 'ecosystem value' of the water produced from the Park is £142m per year.

¹¹ These include wastewater and sewage services, which may lead to slight overestimation in the water services above.

6.7 Summary Value Tables

6.7.1 What produced the value

Table 6.1 The production of value of export goods and services in the LLTNP

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Agriculture - national accounts	£1.0	£1.0	£10.0	£7.0	£19.0	£12.0	£7.0
Forestry - national accounts	£1.4	£1.4	£3.7	£9.4	£15.8	£14.9	£1.0
Aquaculture - national accounts	£0.1	£0.6	£0.8	£2.5	£4.0	£4.0	£0.0
Other food and drink - national accounts	£0.2	£0.6	£2.3	£5.4	£8.5	£8.5	£0.0
Electricity - national accounts	£0.0	£0.1	£0.0	£0.0	£0.1	£0.1	£0.0
Electricity - power production	£3.4	£3.4	£0.2	£1.0	£8.0	£8.0	£0.0
Electricity - carbon and load management premia	£10.0	£8.0	£0.0	£0.0	£18.0	£18.0	£0.0
Water - national accounts basis	£0.0	£2.6	£2.5	£8.8	£13.9	£13.9	£0.0
Water - shadow prices	£142.7	£45.4	£0.0	£0.0	£188.1	£0.0	£188.1
Total	£158.8	£63.0	£19.5	£34.1	£275.4	£79.4	£196.1

There are several important points arising from this table.

Firstly, with regards to the value streams themselves, in the conventional national accounts agriculture, forestry, food and drink (including aquaculture and processing) and water production are broadly equal in value terms. However, this is solely because the national regional accounts as prepared by ONS are based on a top-down allocation from national level relying overwhelmingly (except in the case of North Sea oil and gas, scarcely relevant to the Park) on employment. Since the production of electricity and water is primarily a function of natural and built assets (some of them quite old and consequently well-written-down) then it does not figure in ONS' reckoning of sales and value added - scarcely at all in the case of electricity, and only to a small fraction of its true extent in the case of water.

Secondly, the 'responsibility' for production of export services lies almost entirely with capital - more than half of it with natural capital. Even the built capital was largely created by the Victorians, in the case of water, or our fathers and grandfathers, in the case of the forests, most of remaining water, and electricity. Re-investment in all of these is predominately either just starting, on significant scale, or at the earliest kicked off in the mid 1990s. Note that the substantial investment in forests which is underway has not been included in this table, because we judged that it is not sensible to count it as being funded out of current forest revenues: rather it is a public investment.

6.7.2 Who received the value?

In the case of export services then in all except one case the benefits flow overwhelmingly to the purchasers - outside the Park - of the services. The one exception is the non-market identified in the water shadow price. In the case of the English water authorities, when they were privatised, this should in principle have been realised through the market and received by the Treasury on behalf of the nation. In fact the shares were issued at a low value, so the hidden value of old assets was primarily received by the people and institutions that bought under-valued shares. We have made an allocation of 30 per cent to water customers, who on this argument are enjoying lower prices than marginalist theory indicates they should, 20 per cent to the Scottish nation, which is enjoying higher real incomes and, perhaps more in hope than expectation, 50 per cent to the water assets themselves, as a notional contribution to renewal and development.

Table 6.2 The recipients of value from export goods and services in the LLTNP

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	External Customers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival and non-excludable goods
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Agriculture - national accounts	£19.0	£0.6	£1.0	£17.1	£0.0	£0.0	£0.0	£0.4	£0.0
Forestry - national accounts	£15.8	£1.6	£0.0	£14.2	£0.0	£0.0	£0.0	£0.0	£0.0
Aquaculture - national accounts	£4.0	£0.0	£0.8	£3.2	£0.0	£0.0	£0.0	£0.0	£0.0
Other food and drink - national accounts	£8.5	£0.0	£0.9	£7.7	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - national accounts	£0.1	£0.0	£0.0	£0.1	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - power production	£8.0	£0.0	£0.0	£8.0	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - carbon & load management premia	£18.0	£0.0	£0.0	£18.0	£0.0	£0.0	£0.0	£0.0	£0.0
Water - national accounts basis	£13.9	£0.0	£0.0	£13.9	£0.0	£0.0	£0.0	£0.0	£0.0
Water - shadow prices	£188.1	£0.0	£0.0	£56.4	£0.0	£37.6	£0.0	£94.1	£0.0
Total	£275.4	£2.2	£2.6	£138.6	£0.0	£37.6	£0.0	£94.4	£0.0

7 Production of goods and services for visitors: tourism and recreation

The third objective of the Park Authority is to promote understanding and enjoyment of the special qualities of the Park. Increasing visitor numbers is not *per se* an objective although it might be argued that, given the targets set for tourism by the Scottish Government and as a jewel in the crown of Scottish Tourism, it should be. In addition, as we discuss in Chapter 9 (Global Services), the Park is perfect as a venue for outdoor activity, which has a strongly positive effect on health and welfare.

In practice increasing the number of visitors who use the park and, where applicable, their total expenditure, has been an implicit objective of the NPA. One of the problems, however is that the number of visitors, their activities and their expenditure has never been comprehensively assessed. There have been a number of surveys carried out in the past and still currently, but nowhere has the information from all sources been collated and presented.

This section, therefore, considers all published data and combined with expert opinion tries to present a picture of what is happening. It should be recognised that, as with so much of this report, estimates generated have very wide standard errors i.e. true values might be substantially higher or lower than quoted figures. However it should also be noted that all the figures can be reconciled and are consistent.

7.1 Estimating visitor activity

A visitor day is defined as occurring when any non-resident individual crosses the Park boundary for the purpose of recreation, relaxation and sport. Thus it includes every journey except those for work, education, regular shopping, hospital visiting etc. It should be noted that a number of visits that fall within the international definition of tourism are therefore excluded.

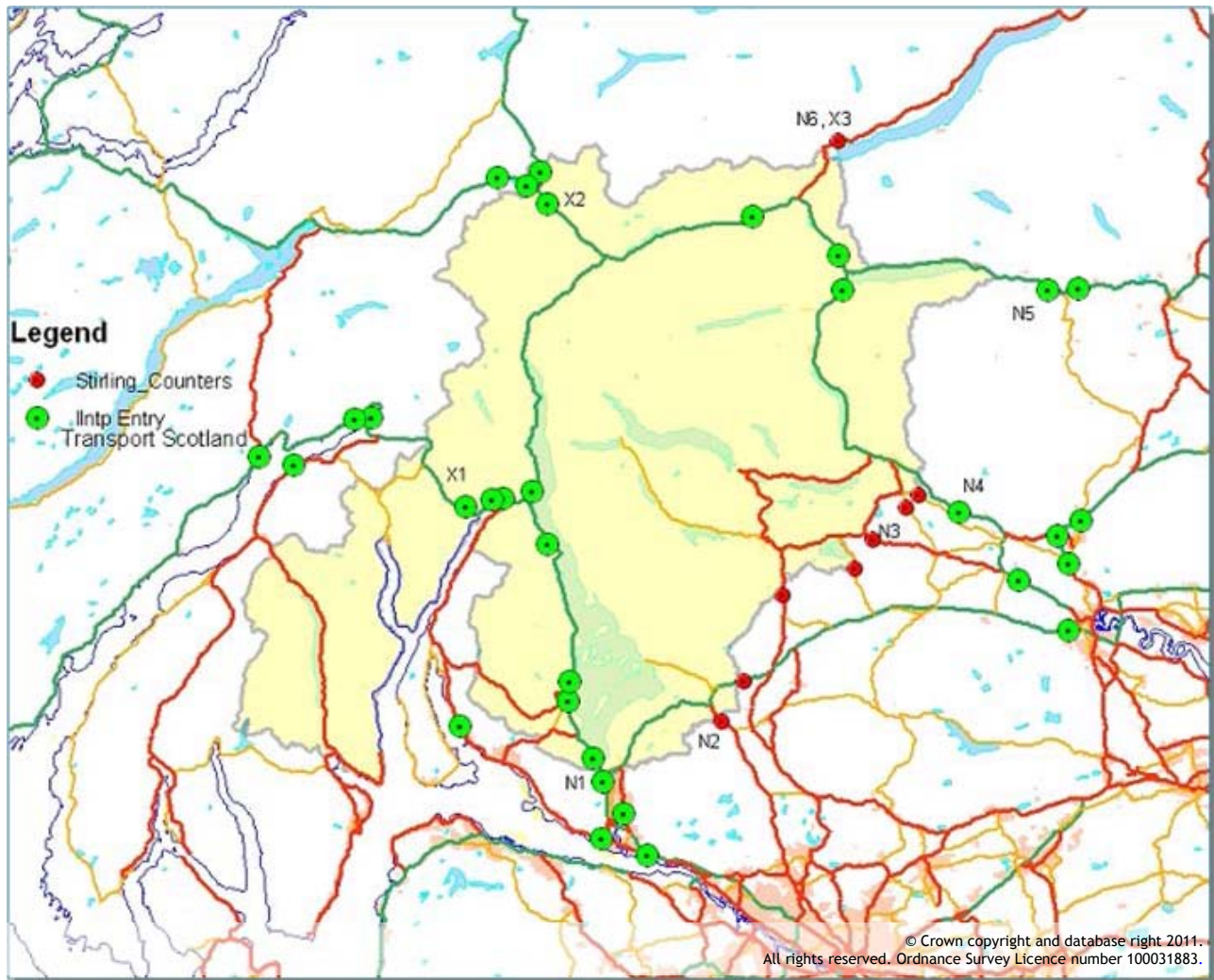
There are clearly two major sources of error. First a visitor stays in the National Park for say six days and never ventures from the area will be recorded as having only a single visitor day. Conversely a visitor who crosses the boundary twice in a day (e.g. somebody who comes to stay in Luss but goes into Helensburgh for an evening meal) will be recorded as having two activity days. It is believed that this measure may underestimate the number of activity days but the level of error will be small compared to the procedure for turning from flows to visitors.

Traffic flows into the Park are highly seasonal because visitor activity is highly seasonal. Travel to work, education etc is not seasonal however, and in the winter months will form the vast majority of the traffic. Consequently we can get some idea of the visitor traffic by subtracting an appropriate proportion of the winter flow. In this case we assume that this is 80 per cent of the minimum of November, January and February.

Figure 7.1 shows the location of counters on the road network. We identified 6 key entry points (N1:N6) and 3 key exit points (X1:X3) and the flow through these points was analysed as follows:

1. From the Transport Scotland monthly counts of vehicles passing counters on Trunk Roads we estimated business, education & normal shopping flows as 80 per cent of the average flow of November January and February. Any entries above this figure were assumed to be visitor vehicles. For example the June Visitor figure would be the difference between the total June flow and 80 per cent of the winter mean. The 80 per cent proportion is critical. At 10 per cent (90 per cent) we started to obtain negative figures for the winter months, and 30 per cent (70 per cent) was judged to be too high. Recently published nationwide research on seasonal patterns in recreation (see section 9) suggests that the proportion might be higher (c25 per cent) and assessing this should be an urgent candidate for further research.
2. Visitor Vehicle (VV) Flow is simply the total of the monthly differences for the year at that entry point.
3. We then calculated the average ratio between the Total July Flow and Annual Visitor Vehicle Flows for all the Transport Scotland entry points.
4. This ratio was then applied to the Stirling Council vehicle counts, which are for July only, to give an annual VV estimate for these points. These flows in fact only constitute 5.9 per cent of the total entries.
5. The Total VV Flow through entries (N1:N10) was then calculated along with the Total VV Flow through Exits (X1:X3).
6. From the National Travel Survey, car occupancy on leisure (holiday and recreation) trips was identified.
7. This number was applied to VV flows to obtain estimates of
 - a) Numbers passing through Park
 - b) Numbers stopping or on Day Trip to Park

Figure 7.1 Vehicle counters in the LLTNP



The upper part of Table 7.1 shows the mean number of “visiting” vehicles entering the Park through the checkpoints and the lower half the number exiting,

Table 7.1 Vehicles entering and exiting the LLTNP

Vehicles entering the LLTNP		Vehicles exiting the LLTNP	
Road	2009 ('000)	Road	2009 ('000)
Stony (A82)	1,119	A82/5	402
A809	175	A83	273
A81	187	A827	80
A873	107		
A84	509		
A85	175		
A827	80		
Total Vehicles Entering	2,353	Total Vehicles Exiting	755
Total vehicles stopping in the LLTNP (i.e. vehicles entering - vehicles exiting)		1,598	

7.1.1 Vehicles and total visitors

Once we have identified the number of vehicles entering the Park and subtracting business and local traffic a key question that follows is the number of visitors expected in a vehicle.

The National Travel Survey records in the Stage file¹² the number of individuals in a party and the mode of transport. Unfortunately the number in the vehicle is expected to vary depending upon the purpose e.g. on the school run we might expect 1 adult and 3 children, on a commuting run a single adult. The number in a vehicle on a typical leisure trip is unknown. The purpose of the trip is however given in the Trip file which can be merged (with some difficulty) with the Stage file. Table 7.2-Table 7.4 give the frequency tables for total, adult only and child only for Day and Holiday trips in motor vehicles derived from this merged file.

Table 7.2 Number of persons in a “leisure” vehicle

Number in Vehicle	Frequency	%
1	13,459	18.4%
2	25,826	35.3%
3	12,662	17.3%
4	13,663	18.7%
5	5,825	8.0%
6	1,218	1.7%
7 or more	574	0.8%
Total	73,227	100.0%

Table 7.3 Number of adults in a “leisure” vehicle with children

Number in Vehicle	Frequency	%
1	5,842	39.1%
2	7,924	53.0%
3	928	6.2%
4	244	1.6%
5	15	0.1%
6	1	0.0%
7	2	0.0%
Total	14,956	100.0%

Table 7.4 Number of children in a “leisure” vehicle with children

Number in Vehicle	Frequency	%
1	4,018	26.9%
2	6,904	46.2%
3	2,893	19.3%
4	880	5.9%
5	251	1.7%
6	10	0.1%
7	2	0.0%
Total	14,958	100.0%

From these tables it appears that the average party size in a leisure vehicle is **2.7**. For adult only parties the mean drops to 2.4 and for family parties it rises to 3.8 (1.7 adults, 2.1 children). The mean number of children in a vehicle is 0.43.

¹² The NTS data is released in 7 files which define a) The characteristics of the various sampling areas b) The household sampled c) the individual sampled in the household, d) the trips undertaken in the scheduled week e) long distance trips taken in the months around the sample week f) The individual trips g) the individual stages within the trips in the scheduled week h) vehicles owned by the household.

7.1.2 Visitors by other modes

Although private cars inevitably dominate tourist transport, certain sectors such as coach based tourism are still important, particularly for hotelier and attractions such as Loch Cruises. In the case of long distance walking and the West Highland line estimates were obtained directly.

Only 2 of the 6 entry points distinguished between vehicle types but because the vast majority of coach tourists at some stage travel along the A82 it is possible to get an estimate of tourist buses from the seasonal analysis. Since load factors were unknown, the number of visitors on a bus was assumed to be 40.

In two cases, Balloch Station and numbers cycling, no seasonal data was available. We were thus unable to obtain estimates of pedestrians entering the Park from Balloch Station, which may well be considerable. The suggested numbers simply reflect limited expert opinion and best guess estimates.

7.1.3 Total visitors by mode

Table 7.5 shows the results from the traffic counts and seasonal decomposition plus information obtained from the NP on long distance walkers.

Table 7.5 Number of visitors to the National Park by travel mode

Mode	Activity Days ('000)	Percent	Data Method
Car/Minibus	6,353	90.8%	Traffic counters 10 entry points.
PGV/Tour Bus	336	4.8%	Traffic counters 2 main entry points.
Rail (West Highland)	177	2.5%	Seasonal analysis of total numbers
Rail (Balloch)	100	1.4%	No direct data
Foot (LDP)	16	0.2%	Participants *3 days
Cycling	15	0.2%	No direct data
Total	6,998	100.0%	

It should be remembered however that this total includes visitors *en route*. These are shown in the following table.

Table 7.6 Number of visitors *en route* through the Park by mode

Mode	Activity Days ('000)	Percent	Data Method
Car/Minibus	1,822	85.2%	Traffic counter main exit point.
PGV/Tour Bus	125	5.8%	Traffic counters 2 main exit points.
Rail (West Highland)	167	7.8%	Estimated 10000 at local stations
Rail (Balloch)	0	0.0%	
Foot (LDP)	16	0.8%	
Cycling	7	0.4%	No direct data
Total	2,138	100.0%	

Finally Table 7.7 provides estimates of those whose journeys terminate in the Park.

Table 7.7 Number of visitors whose journeys terminate in the Park by mode

Mode	Activity Days ('000)	Percent	Data Method
Car/Minibus	4,531	93.2%	Traffic Counter Main Exit point.
PGV/Tour Bus	211	4.3%	Traffic Counters 2 main exit points.
Rail (West Highland)	10	0.2%	Estimated 10000 at local stations
Rail (Balloch)	100	2.1%	
Foot (LDP)	0	0.0%	
Cycling	7	0.2%	No Direct Data
Total	4,860	100.0%	

7.2 Estimating value

In trying to estimate the Value of the activities undertaken by visitors we need to combine the expenditure they make with the surplus. This surplus however may well be unrelated to any expenditure. Consider, for example a hill walker from the south spending a weekend in the Park. He will generate expenditure in accommodation, in hospitality (cups of coffee), in retail (food purchase) and possibly local transport. There may well be a surplus associated with each of these activities. The main activity Hill-Walking, which carries with it the highest utility (Consumer Surplus), has no attached expenditure and has to be estimated using the various approaches discussed in Chapters 2 and 3.

In this report we try to identify the “value” of the activities that attract people to the Park and then add on the “value” of being a visitor in the park. In this way we do not have to identify the number of bed nights associated with an activity simply bed nights in total. The major problem is that there is relatively scant information on what people do and, equally, visitors may do a lot or no activities. As our analysis shows there is a large body of visitors who fall into the class which we term Undefined Mixed Activities and the consumer surplus associated with this class is speculative.

It is worth noting that although we identify “In Transit” visitors, they are treated in exactly the same way as other visitors. Some (many) may pass through the Park in an hour and simply get the benefit of the scenery. Others may stay in the Park for a week or more and carry out many activities before moving on. We have no information on them but, importantly, need none in calculating value.

7.3 Accommodation, catering and other visitor services

7.3.1 The 2005 activity survey

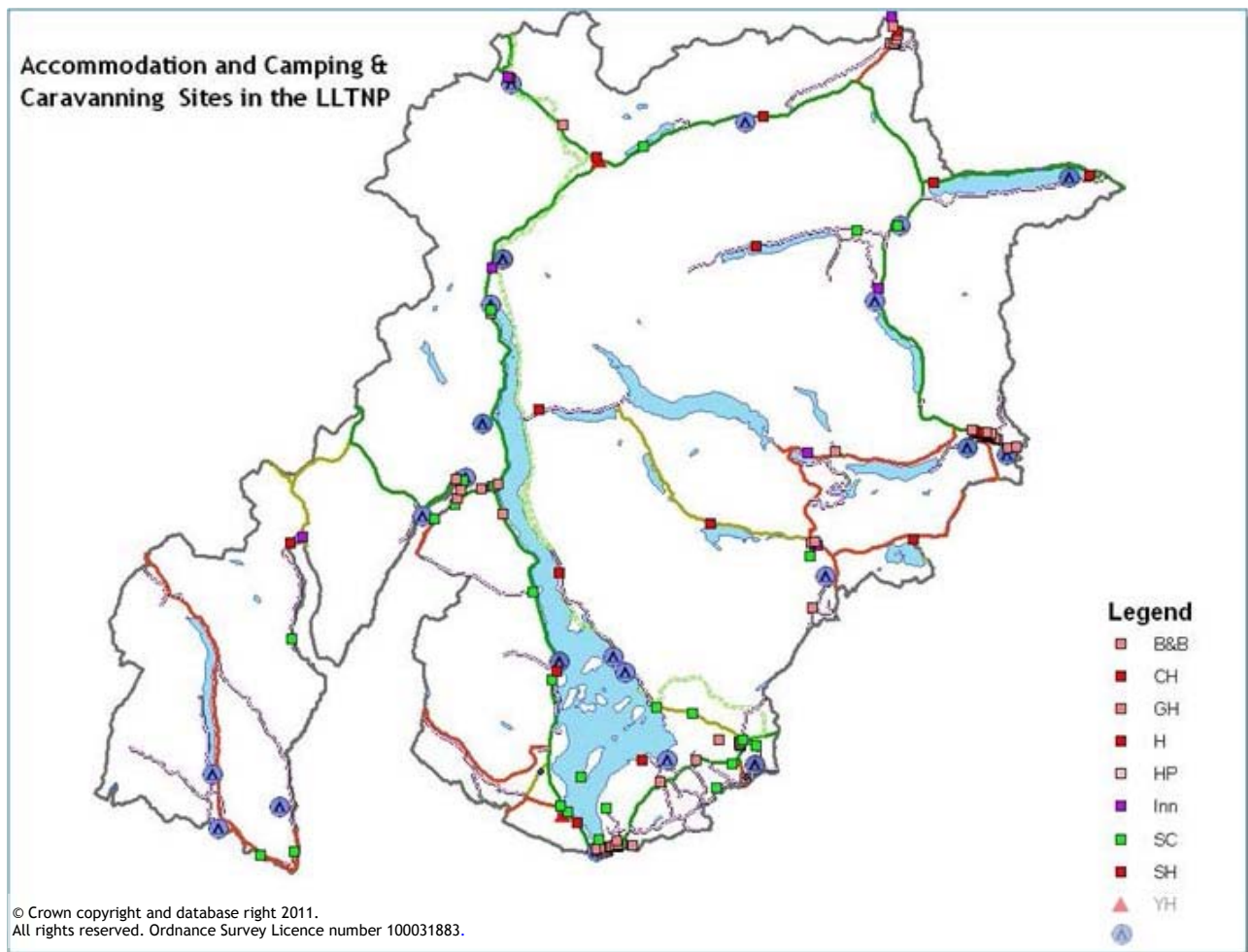
In 2005 an activity survey was carried out for the NPA. The basic design involved random sampling of visitors in locations throughout the Park combined with a quota sample of residents in these locations. The survey sought to identify the proportion of visitors staying overnight, the activities they had undertaken and their expenditure. Unfortunately the survey was fundamentally flawed. A very large proportion of visitors occur close to the southern boundary of the Park and these are almost wholly day trippers. Thus equal sampling on a geographic basis leads to significant bias towards those staying overnight with high expenditures. Equally low income groups, particularly young families were underrepresented. For example the vast majority of families without access to a motor vehicle would come into the Park at Balloch station. In these circumstances we would expect per day estimates of expenditure to be biased upwards.

In addition, and more importantly, the survey only questioned adults. As discussed in section 7.1.1 the mean group in a leisure vehicle consists of 2.27 adults and 0.43 children. Assuming this ratio applies to visitors throughout the Park area then the expenditure per visitor including children will be 83.7 per cent of that reported by the survey. If all adults questioned were actually part of family groups then the expenditure per visitor would be 44.7 per cent. Given the bias discussed earlier it would appear that the actual expenditure per visitor (including children) might be as little as two thirds of that presented in the survey.

7.3.2 Estimating accommodation use and expenditure

Two approaches were used in assessing the “value” generated by the accommodation sector in the National Park. The first approach might be best described as “bottom up”. A list of registered accommodation list was obtained from Visit Scotland. This contained postcodes which were converted to 12 figure grid references and located on a GIS map. Accommodation within the National Park was selected and the resulting file transferred to Excel.

Figure 7.2 Plot of registered accommodation establishments in the LLTNP



A. Overnight visitors

We estimated that an additional 100 accommodation establishments existed that were not registered with VisitScotland. These were distributed proportionately amongst the types of accommodation and average beds/plots and bedrooms were applied to obtain total capacity.

Total overnights were calculated by applying the occupancy rate 2010 published by VisitScotland by type of establishment by the total estimated number of days the establishments are open in the year.

Table 7.8 Registered and unregistered accommodation in the National Park

Type	Total estimated units	Total estimated bedrooms/plots	Total estimated beds	Total estimated overnights ('000)
Hostels	15	637 ¹³	637	115
Caravan & Camping Parks	25	3,682	12,442	933
Self Catering	140	1,572	1,991	298
Serviced	212	3,878	4,781	658
B&B	100	644	522	95
Hotel	20	1,525	2,793	312
Other Serviced	92	1,709	1,466	251
Total	392	9,769	19,851	2,003

The Visitor Survey carried out last in 2005 uses a sampling scheme based roughly on equal area coverage. However, as might be expected, day trippers would appear to be concentrated in locations close to the major conurbations. For

¹³ For hostels, this represents the number of beds

example there may be as many as 1.5m visitors to the Lomond Shores/Duck Bay area, predominantly day trippers, whilst relatively few make the journey round to Loch Eck., where those staying overnight particularly in camping and caravan parks predominate. The result of the sampling strategy is to **substantially overestimate the proportion staying overnight**.

Overall just under 30 per cent of activity days are undertaken by those staying overnight in the Park which approximates to around 1 in 9 of visitors i.e. 8 in 9 are day trippers.

The Visitor Survey 2005 should be reliable in identifying the average length of stay of those overnighiting. The resulting weighted mean is 2.8 nights, which **implies some 715,500 individuals stay during any year**.

The Visitor Survey 2005 should also be reasonably accurate in its estimate of £23.93 per night (2005 prices), £25.72 in 2010 prices reflecting the dominance of caravan and camping in the overnight mix. This was applied to total overnights, providing **a revenue estimate of £51.5m**.

B. Consumer surplus, landscape value and accommodation

There is clearly value from a location on the shores of Loch Lomond looking over to Ben Lomond. Riddington et al (2008) estimated the value of a good view in a hotel could be in excess of £20 per night. It seems reasonable to suppose that this benefit still applies to the marginal consumer i.e. the revenue generated for accommodation in the Park includes the value of landscape.

In the following tables we identify landscape value separately because we want to identify the value of the environment in the output of the market sector. In practice this is subsumed within the price that was paid for the site (or rental values) i.e. the cost of capital and the rents paid. This is discussed further when we develop the accounts system in Chapter 10.

The consumer surplus for accommodation is taken to be 25 per cent of the expenditure.

C. Estimate of employment

Finally, calculations were undertaken to estimate staff numbers and wages associated with accommodation. Estimates were applied for each type of establishment to total units except for hotels, where this was applied to total bedrooms.

Table 7.9 Calculating staff employed in accommodation sector in the LLTNP

Type	Units	FTE ratio per Unit	Total staff
Hostels	15	2	29
Caravan & Camping Parks	25	2	51
Self Catering	140	2	281
<i>Serviced</i>			<i>1,300</i>
B&B	100	2	201
Hotel	1,525*	0.6	915
Other Serviced	92	2	185
Total			1,661

** average staff numbers were applied to establishments in all types of accommodation except for hotels, where this was applied to number of rooms.*

Table 7.10 Summary of accommodation: benefits, costs and value

Benefits	£ ('000)	Notes
Revenue	£43,127	
Of which Landscape Value	£13,002	Based on a conservative landscape value of £6.49
Consumer Surplus	£10,782	25% of Revenue
Employee Surplus	Very small	due to local shortage of labour
Owner Surplus	Small	The LLTNPA policy of encouraging accommodation developments should make this small but if large estates monopolise key sites then this will be reflected in purchase prices or rents.
Public Health		
Total Benefits	£53,909	
Costs		
Rent, Maintenance & Repair, Capital	£10,923	
Staff (including owners)	£32,204	
Total Costs	£43,127	

7.3.3 Health clubs, spas, gyms etc

Detailed examination of the BRES identified some 160 FTES associated with Sports Clubs and Facilities and a further 38 with Operation of Sports Facilities with expenditure of over £9.3m. Apart from Golf the only other major commercial activity associated with sports facilities are Health Clubs and Gyms. The National Park has at least 5 “high end” spas detailed below, and there may be other Clubs etc that provide some 153 jobs.

Table 7.11 ‘High end’ health clubs and spas in the LLTNP

Name	Hotel	Location	Typical Price
Relax Health Club	Buchanan Arms	Drymen	£99 for 2 treatments
Vital Health and Wellbeing	McDonald Forest Hills	Aberfoyle	£210 for 2.5 hours
Cameron House Spa	Carrick Golf Course	Arden, Loch Lomond	£270 for 5 hours
The Cameron Club	Cameron House	Arden, Loch Lomond	From £99 for 2 hours
Loch Lomond Spa	Loch Lomond Golf Club	Luss	£200 for 2.5 hrs

The consumer surplus for all day activities has been assumed to have been captured in the general consumer surplus for unspecified miscellaneous activities.

7.3.4 Gross value added and the national estimates

For the commercial sectors of the National Park’s economy normally the “best” approach is by modelling down from national and regional statistics, the approach taken in DREAM®. There are two basic reasons

- Variances in regional productivity are likely to be less significant than errors from survey design (e.g. in numbers drawn from each location)
- Definitions are consistent in all studies and numbers have to be consistent between the selected region and other regions of Scotland.

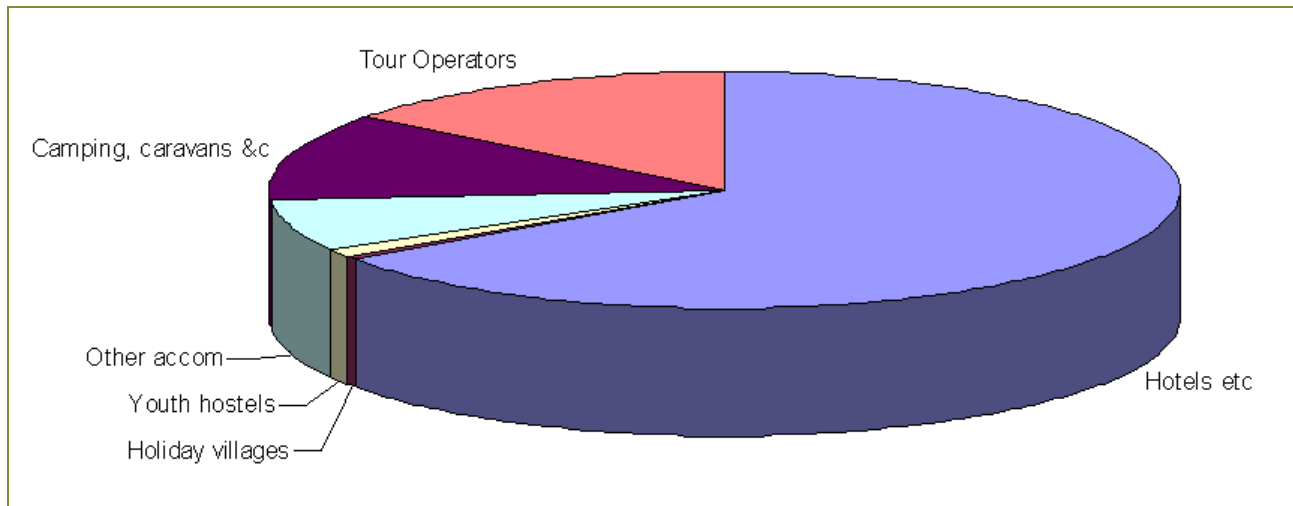
This is not to say that DREAM® estimates are perfect, only that, in general, where available, they are preferable.

For accommodation we estimate some 1,241 employees in the accommodation sector, compared to 1,661 estimated using bed-spaces and employee ratios. We hypothesise that the differences probably reflect part-time/ full time definitions; the official statistics being much tighter. DREAM® also estimates **Expenditure** in the accommodation sector in the Park to be **£62.2m**.

However the situation is confused by the ownership of at least two large hotels in the area by coach operators. Within the data this appears as 38.5 FTES and £10.52m expenditure, giving an overall total of **£72.9m**.

Figure 7.3 shows the DREAM® estimated breakdown between the accommodation sectors.

Figure 7.3 DREAM® estimated breakdown of expenditure within the accommodation sector



The differences between the survey and DREAM® approaches reflect the use of hotels for services like eating and drinking. We would expect this to be reflected in the estimates for hospitality.

7.3.5 Hospitality

As with accommodation there are two approaches to the estimation of expenditure on hospitality, bottom up and top down (DREAM®). Table 7.12 shows the expenditures per had identified in the 2005 visitor survey at 2010 prices.

Table 7.12 Expenditures identified in Visitor Survey 2005

	Day Tripper	Short Break (1-4 nights)	Long Break (5+ Nights)	Average
Accommodation	-	£25.72	£25.72	£25.72
Food & Drink	£7.02	£20.46	£20.78	£20.63
Entertainment	£1.19	£2.77	£4.22	£3.60
Shopping	£2.64	£10.53	£18.04	£14.28
Transport In Area	£1.89	£3.43	£4.93	£4.18
Miscellaneous	£0.25	£0.69	£0.91	£0.80

Table 7.13 shows the number of visitors by type and estimated total expenditure after adjustment for children and bias.

Table 7.13 Visitor type and total associated expenditure

	Day Tripper ('000)	Overnights ('000)	Total ('000)
Number	4,995	2,003	6,998
Food & Drink	£69,180	£27,546	£96,727
Entertainment	£14,065	£4,809	£18,874
Total	£83,246	£32,355	£115,601

We believe these to be substantial over-estimates for the following reasons

1. Survey design is biased towards visitors to towns who will be spending money on hospitality
2. Survey is of adult spending rather than per capita spending
3. Spending on Food and Drink in Hotels may well be in Hotel spend
4. Spending on Food and Drink for self caterers should be in Retail not Hospitality. With a large self catering sector this could be a sizable element of the expenditure.

We now turn to the DREAM® estimates.

These suggest that there are 354 FTEs employed in Hospitality Services in the Park coping with a total expenditure of £17.5m, just under £50,000 per head.

This seems reasonable so if the DREAM® figures are underestimates it suggests the numbers recorded for the sector are too low. This is possible because both hotel restaurants and, to a lesser extent, retail outlets might well be providing what should properly be classified as Hospitality services. However if this is the case it will be balanced out and there will not be an underestimate in the total value of services; one of the fundamental strengths of the DREAM® approach.

Consequently, whilst we believe that DREAM® generates an overestimate of the value of hotel services and an underestimate of the value of hospitality services, overall we prefer to use these as the effect should be neutral.

7.3.6 Retail

Like hospitality, estimates of retail spend from the activity survey lead to substantial overspend for exactly the same reasons. In addition the categorisation used is not helpful when defining groups. In this section therefore we utilise the DREAM® estimates.

Like hospitality, retail is split between local and visitor services. In general we would expect locals to consume the service at approximately the same rate as the populace at large; thus if the population of the park is 0.25 per cent of the population then it would consume 0.25 per cent of a service such as retailing clothing. Any difference could then be attributable to visitors. As an obvious example, petrol retailing in the park is higher than might be expected based simply on the population. A problem with this approach is that it fails to take into account the work patterns of the population. A large proportion of the working population of the Park are professionals who commute (with significant numbers of low paid workers commuting into the Park to service the hotels). The large food stores and retail parks in the urban centres or en route to the Park provide the retail services for the locals. Conversely the local store provides supplies for the self catering visitor.

Allowing for the “retail commuting” suggests that some 122 jobs in retail are dependent upon visitor spending and that that spending is worth some £30.5m.

7.3.7 Other visitor services

In addition to the three main categories there are a host of other services dependent or partially dependent upon visitors. Some such as boatyard services, boat tours and golf have already been discussed under activities. However there are a number of others such as booking events, local transport, tour operators, leasing agents, visitor centre employees that all make a significant contribution to the economy. Figure 7.4 and Figure 7.5 show ALL activities where there is some employment and the associated expenditure.

Figure 7.4 DREAM® breakdown visitor services jobs in the LLTNP

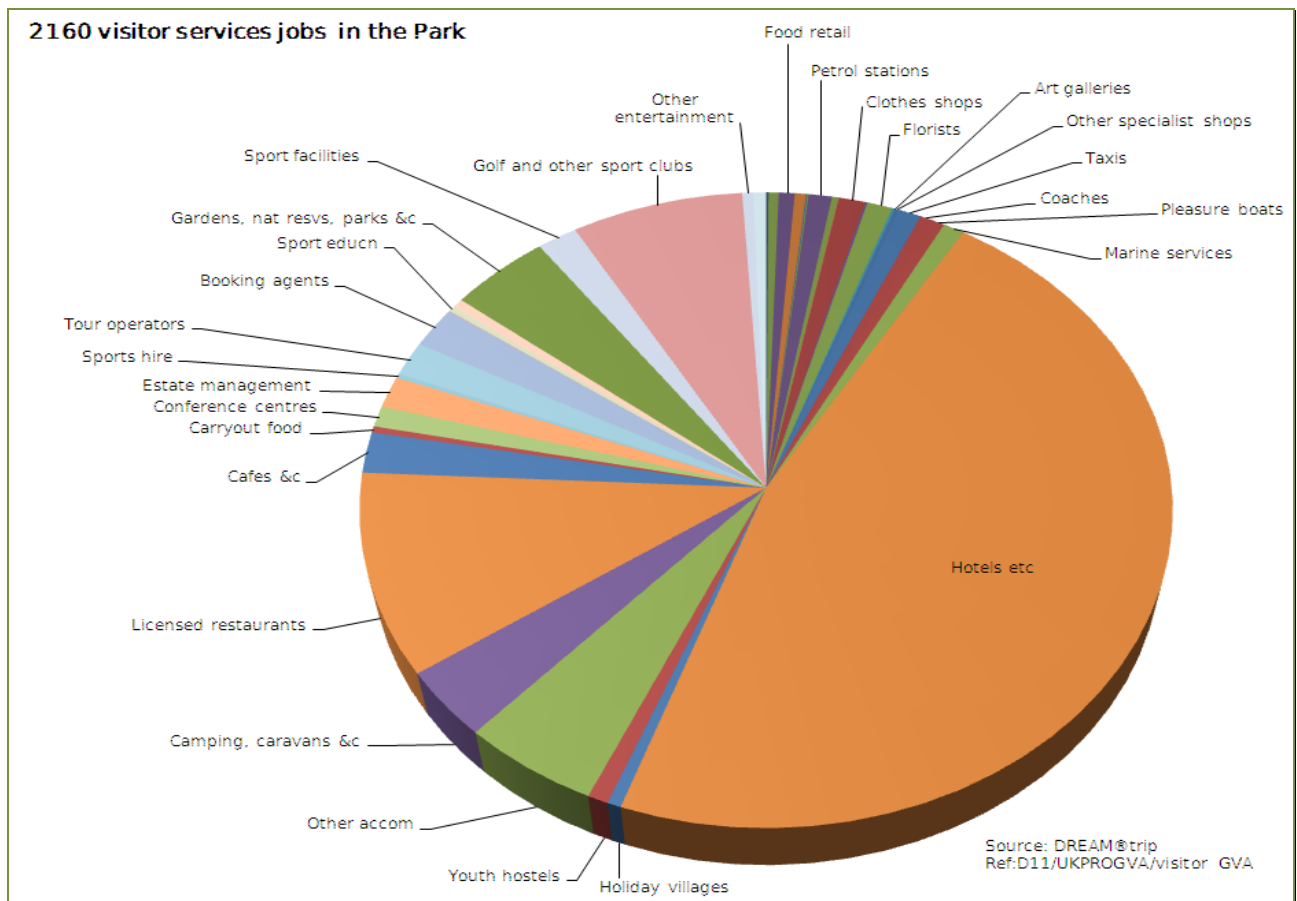
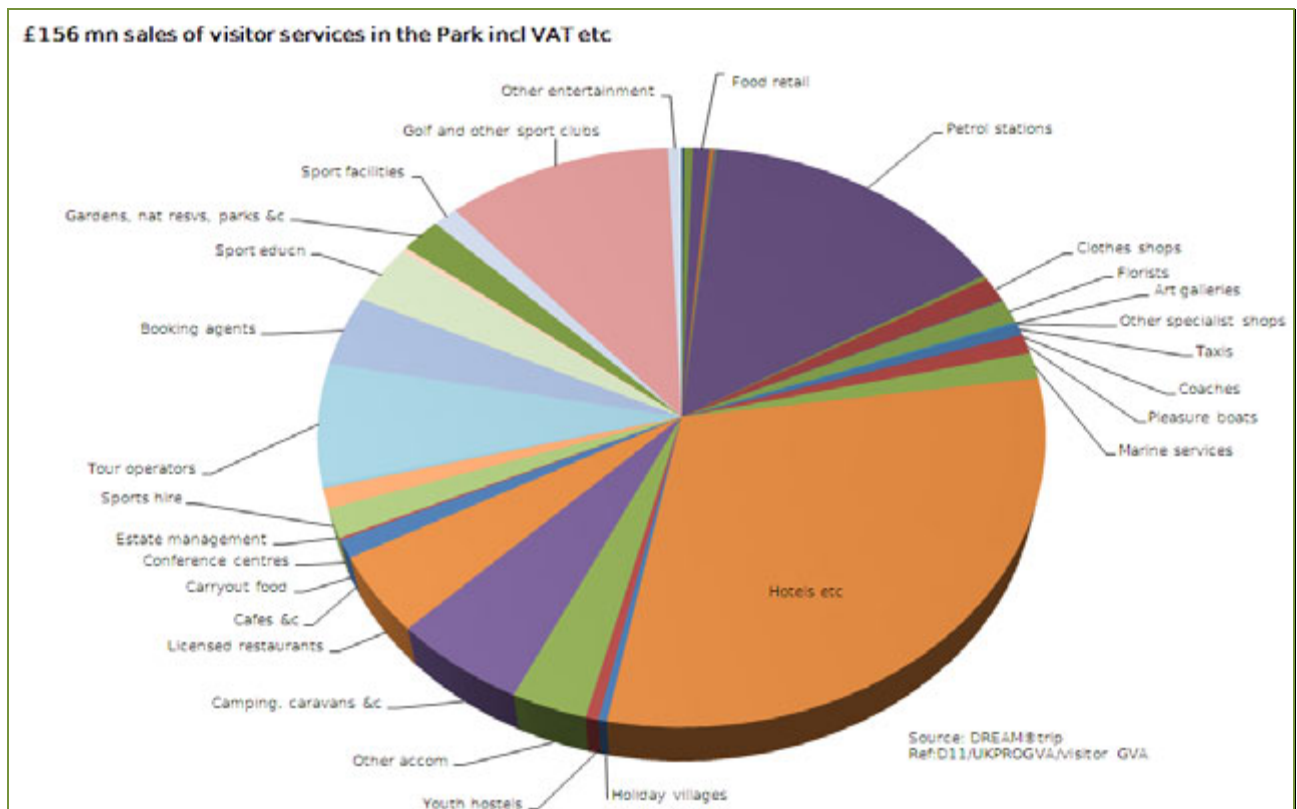


Figure 7.5 DREAM® breakdown sales of visitor services in the LLTNP (incl VAT)



Together the expenditure on visitor services is estimated to be £156m of which £12.9m is in these “other services”.

7.4 Land-based activities

7.4.1 Hill walking/hiking

As discussed in Chapter 4 (Register of Assets), the LLTNP offers enormous possibilities for some of the most spectacular and rewarding hill walks in the country. Although few are spectacularly high, most walks start at or close to sea level and offer as serious a challenge as higher mountains. Indeed one of the two most popular hills, Ben Arthur (The Cobbler) does not reach Munro height and many consider its near neighbour, Beinn an Lochan, another non Munro, to be amongst the best walks in the country.

Assessment of the numbers hill walking poses a number of problems

- 1) Definition
- 2) Accurate counts
- 3) Multiple Peaks in a day

For the purpose of this study we have defined a day's activity of hill walking as any trip that exceeds 3 hours including journey time. Although many of the hills, particularly the lower summits such as Conic Hill can easily be climbed in that time, if a 30 minute plus journey is involved then the hill walk becomes the focus of the day.

It was expected that visitor counters would have been installed on a number of the most popular routes. To our surprise only Ben Lomond had a working counter. It recorded some 60,000 passes or 30,000 climbers in 2010. The Cobbler also had a counter in 2006 which recorded over 100,000 movements. This included a number of groups on short walks from the Arrochar Car Park and after discussion the number of walkers on the hill was estimated at 40,000 p.a.

The Cobbler path presents a typical problem of allocating numbers. Many, possibly most, walkers climbing Ben lme and Beinn Narnain will use the Cobbler path and a day's activity will include one, two or all three of these peaks. After discussion with experienced/expert hill walkers, Main Objective peaks were defined and only these were analysed; the remainder being assumed to occur during a trip to a main objective peak.

During discussions with the expert group it became very clear that they had no idea about total numbers climbing a hill like Ben Lomond and consequently their judgement of hills like Ben Vorlich was likely to be equally awry. However there was a degree of consistency about the relative popularity of the climbs. Agreed rankings were translated into proportions climbing Ben Lomond and hence to absolute numbers. These were then summed to give a total number of activity days for Hill walking.

As with so much of this report the final total estimate of 426,000 days has a substantial variance. However we are confident that the number of days is considerably larger than 200,000 and certainly does not reach 800,000. To that extent it is revealing when compared with other activities such as Off Road Biking (15,000) or Kayaking (6,000).

We were unable to obtain any reasonable estimate of the mean WTP for hill walking. The best available was a TCM study by Hanley applied to car parks on the East of Loch Lomond. Obviously some of the visitors in these cars could have been on short walks or in boats, however it was believed that this estimate was probably the best available. Since the calculated consumer surplus applied to the whole car and the vehicle had, on average 2.7 visitors the consumer surplus per head was estimated to be £8.74.

Table 7.14 shows the calculated Costs and Benefits which results in a Total Value of £3.48m.

Table 7.14 Summary of hill walking: benefits, costs and total value

Benefits	£ (‘000)	Notes
Revenue (Guides)	<£100	
Consumer Surplus	£3,723	426,000 * £8.74
Employee & Owner Surplus	Minimal	
Volunteers		Consumer Surplus includes benefit from voluntary work
Public Health		
Total Benefits	£3,823	
Costs		
Guides, Rangers	£200	
Maintenance, Repair (Depreciation), Management Staff:	£148	Ben Lomond * 10
Volunteers		
Total Costs	£348	
Total Value	£3,475	

In addition there are an estimated 16,500 activity days arising from Long Distance Walking. There is a small support industry which mainly provides luggage transport and a booking service. This is assumed to have a value of just over £50,000. Thus **the total hill and long distance walking sector is valued at £3.5m.**

7.4.2 Cycling

Although cycling numbers are relatively small there is substantial growth in some sectors. In addition it is an important alternative in the challenge of increasing exercise in the population as a whole.

For the purposes of this analysis we identify 3 groups

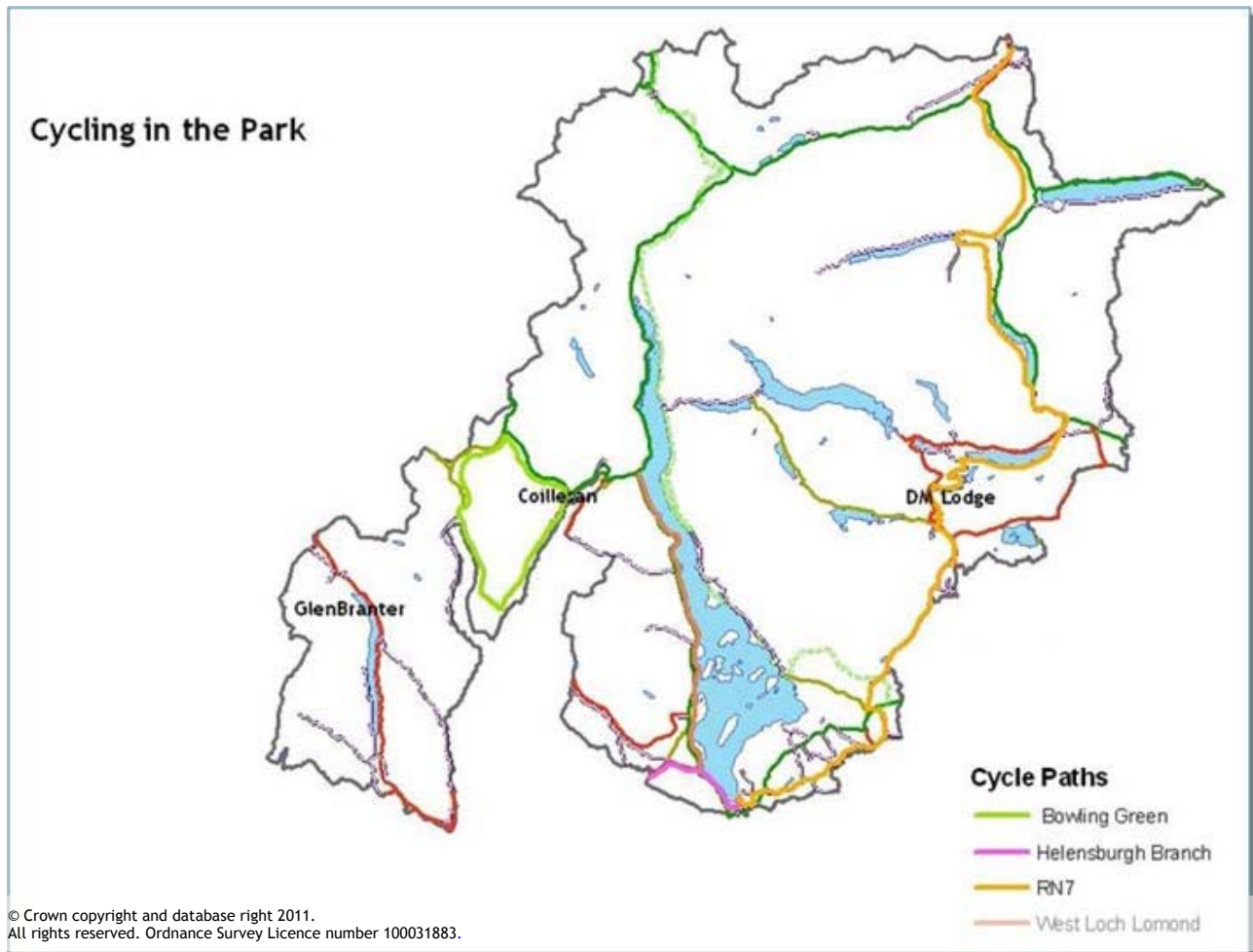
1. The “club” or road cyclist
2. The family off road cyclist
3. Mountain Bikers

Whilst the group boundaries are fuzzy it is useful in defining the value of the Park for them.

The key feature of the activity for the on road cyclist is exercise; the pleasure that comes from physically working close to the limit and generating speed. The environment has, as a result, little impact compared to physical features like steepness of hills and quality of road surface. Groups can be seen on roads in the area and the Dukes Pass is a popular challenge. Numbers however are small and the value of the park environment very low.

The second and potentially largest group, are those using the network of cycle paths and forest tracks to enjoy the environment. The most important path is the West Loch Lomond path from Balloch to Tarbert that utilises the old road where it has been rebuilt. There is also the branch from Helensburgh to Balloch and the Sustrans cycle route 7 which swings east from Balloch then heads north via Aberfoyle and Loch Venachar to Callander. From Callander it follows the old rail route past Balquhidder and up Glen Ogle to Killin. These routes are suitable for young families. These routes are illustrated in the following figure.

Figure 7.6 Cycle routes



Whilst the surface quality of most of the cycle paths suggests a heavier wider frame and tyre than a road bike, for forest tracks a mountain bike is almost essential. The National Park has a number of popular circuits at Glenbranter, Coillesan and Aberfoyle (David Marshall Lodge and Loch Venachar). Generally these are too long and arduous for children.

Finally there is a way-marked downhill mountain bike track at Glen Branter. These are targeted towards young people interested in displaying skills and getting thrills.

The infrastructure for off road biking of all grades exists in the Park, although there is, arguably, room for more developed downhill tracks with mechanical uplift.

Numbers however are low. The only survey conducted by Park Rangers put 2010 numbers of 750 on West Loch Lomond and 500 on NR7. Observation and non-expert opinion suggests that these may be underestimates although numbers at Glen Branter were also put at less than 1000. Thus it seems that a top estimate for off road cyclists of 15,000 is possibly an overestimate. Without any guidance on numbers we have assumed an equal number of on-road cyclists.

To assess the NEV we have used the figure obtained from Hanley of £7.84. The consumer surplus attributable to the Park for on road cyclists is far smaller because only a small proportion of the journey will be in the Park and the WTP will, in any case be lower because the Park offers little special for the road cyclist. For this exercise we have used a nominal £1. **Together these suggest a Net Economic Value of £132,600.**

Table 7.15 Summary of cycling: benefits, costs and total value

Benefits	£ (‘000)	Notes
Revenue		n/a
Consumer Surplus	£133	Off-road cycling: 15,000 * £7.84 + on-road cycling: 15,000 * £1
Employee Surplus		n/a
Owner Surplus		n/a
Public Health		
Total Benefits	£133	
Costs		
Rent, Maintenance & Repair		n/a
Staff (including owners)		n/a
Capital		n/a
Total Costs	£0	
Total Value	£133	

7.4.3 Golf

Golf is an interesting example of how the Park’s exceptional natural assets are valued highly around the world. This comes out in the successive calculations and data extractions we made to estimate the golf value stream.

Our original calculations were based on a VisitScotland survey of the amount of play in clubs across Scotland, and a KPMG survey of the economics of clubs across the world, reported as UK and Ireland averages. They were based on the assumption that LLTNP clubs reflect the average, subject to parameters that can be easily measured, as indicated in the Register of Assets. They indicated turnover of £2.2m and labour costs of £0.6m, so GVA of about £0.8m.

However the collected economic statistics, the ABI/BRES gives, for 2010, for sports clubs (and we can think of little beyond golf) turnover of more than ten times these figures: £21m, GVA of £11m, a wage bill of £8m and more than 200 employees. The monetary figures are initially based on UK averages for sports clubs, but adjusted for local conditions. These figures will include some recreation and spa facilities (e.g. the Carrick Club) and also in 2010 the expenditure associated with the Scottish Open.

Part of the reason for this is that the Loch Lomond Golf Club, one of the most expensive and restricted golf clubs in the world, does not take part in any of the surveys. Press comment suggests that there are 400-850 members, each with debentures (variously valued at £55 000-£100 000 each, so totalling £22-£85m, indicating a capital value of £30-£120 mn) and paying £4000 per year, making £1.6-£3.4m per year revenue in annual subs alone. Anecdotally at other clubs green fees are quoted as £150 per round for members, after a small free allowance. The accommodation and catering are highly commended in reviews. Local estimates suggest that there are over 100 employees, although a number of these will be part-time and/or seasonal.

The capital value is broadly confirmed by the bid and offer prices talked about when the former owner had his other debts called in because (according to press reports) Bank of Scotland was in trouble. These prices were around £100m. An asset of this magnitude, even a property-based one, would suggest an annual revenue from all club activities (including catering, accommodation and so on) easily exceeding £10 million. The Loch Lomond Club is clearly a case of an owner restricting use and raising the price, as indicated (for fishing) in Appendix 3.

There is also the question - at least until this year - of the value of the televised tournaments held at Loch Lomond. They have 50 000 attendees per day for a week, and are usually quoted as generating many millions of direct economic impact. The golf value estimates espoused by VisitScotland and Ministers are £30-£40m for the Open at St Andrews, so perhaps £10m for the Scottish Open. These estimates are based on the spending of visitors, organisers and the like, with a similar sum, sometimes even bigger, for the ‘value’ of the television time as a national advertisement. The tournament week does, of course, open up to a large number of people the scenery and other particular environmental aspects of this wonderful promontory, both in attending and in watching it on TV.

In theory, if there is spare capacity, the profit maximising firm will drop prices until the marginal cost is zero and for the linear production function this defines the consumer surplus as equal to the revenue. According to Donnelly et al the same result occurs with the Semi-Log function. This surprising result however does not appear to hold in practice, possibly because the businesses do not have spare capacity at key times. Instead the paper by Donnelly suggested a mean per cap surplus of \$18.44 on a price of \$49, 37.8 per cent of the revenue. Applying this percentage to the total revenue gives a Consumer Surplus of £4m.

Many Golf Clubs appear to operate on long leases from landowners or have been established as independent subsidiaries paying an economic rent to the landowner. We were anxious to investigate the size of the rents as these reflect a contribution from Natural Assets to the value of the activity. The Price Waterhouse study suggested to us that a lease of around 20 per cent of the revenue was of the right magnitude and this has been applied. In summary we estimate the value of golf in the LLTNP as shown in Table 7.16.

Table 7.16 Summary of golf: benefits, costs and total value

Activity days	39,236 - 57,955 (average = 48,595)
	£ (‘000)
Benefits	
Revenue	£11,156
Consumer Surplus	£4,217
Owner Surplus	£800
Public Health	
Total Benefits	£16,173
Costs	
Maintenance	£1,031
Labour	£3,264
Water	£601
Rent	£1,570
Other Costs	£2,123
Total Costs	£8,590
Total Value	£7,583

7.4.4 Boat and bike hire

Renting activity equipment is identified as a separate activity in the business survey¹⁴. Table 7.17 shows five operators identified from the web: two bike hire operators, one boat hire and two hiring out both bikes and boats. Within the Park the business survey suggests 12.5 FTEs which, using national ratios would suggest total GVA of £500,000 based on tourist expenditure of £700,000.

Table 7.17 Summary of boat and bike hire businesses in the LLTNP

Business	Location	Bike ppd	Canoe (2P) pph
Wheels	Nr Callendar	£18	n.a.
Can You Experience	Balloch	£17	£17
Mounter	Callendar	£15	n.a.
Go Country	Kinlochard	£14	£18 (£60)
Macfarlane & Son	Balamaha	n.a.	£30 (clinker dinghy, £50 (with outboard))

The consumer surplus from hires is identified in the surplus of the activities (i.e. cycling and boating) themselves.

7.4.5 Other land-based activities

Within the National Park are a variety of other activities often associated with Country Sports. Shooting rights for the area north of Loch Katrine, for example, are leased from Forestry Commission. Shooting and stalking occur throughout the Park but we have no information on availability or numbers. Some of the “new” country sports such as off-road driving and quad biking also make an appearance. Although we have not recorded them separately they will occur in the activity days allocated to the miscellaneous Undefined Mixed Activities because it is estimated as a residual, albeit a very large one. The extent of under or overestimation of the value of the Park as a result of this specific omission is determined by the consumer and owner surplus associated with these activities.

7.5 Water-based activities

Water recreation has traditionally an important role in the tourism economy of the Park area. The original pattern of paddle steamers and rowboats has evolved to embrace everything from jet-skis to solar powered trip boats, with significant numbers of canoes and kayaks.

The main centre is, unsurprisingly, Loch Lomond but there are also significant numbers of tourists on the paddle steamer the Sir Walter Scott and sailing and canoeing on Loch Earn, Loch Lubnaig, Loch Venachar, Loch Ard and Loch Eck. There are Outdoor Activity Centres as shown in Table 7.18. The centre at Blairvadach, Helensburgh also uses Loch Lomond regularly.

¹⁴ Retail of sports equipment is covered under Retail.

Table 7.18 Centres within LLTNP offering outdoor activity courses for young people

Name	Water	Owner	Beds
Lochgoilhead	Loch Goil	Scout Assoc	150
Ardroy	Loch Goil	Fife Council	70
Ardmay	Loch Long E	Ardmay House	60
Ardentinny	Loch Long W	Actual Reality	80
Benmore	Loch Long W	Edinburgh Council	100
Lochearnhead	Loch Earn	Hertfordshire Scouts	90
Dounans	Loch Ard	SOEC	250
McGregors, Ardlui	Loch Lomond W	West Dumbarton Council	40
Trossachs	Loch Venachar	Forth Valley Scouts	20

Loch Earn Water Sports offers courses in paddle sports and sailing and canoe and boat hire is available at Lomond Shores (Can-Do) and Balmaha. Standing Waves offers canoe courses with beginner sessions based at Loch Luibnig.

There is a range of river based paddle sports in the Park ranging from the beginner waters of the Teith to serious white water at the Falls of Leny and on the Falloch. Compared to recreational canoeing/kayaking on Loch Lomond, however, the numbers are very small.

7.5.1 Data sources

The key data source is the Loch Lomond Boat survey conducted by Glasgow University over the summer months every year since 1989. The method used is to tour the loch between 12 and 2pm on a sample summer of weekdays and weekends recording the number, type and location of boats. The consistency of approach and accuracy of the survey makes this an extraordinarily good data set to examine trends in water usage over the last two decades.

In 1989 and 2009 the survey was supplemented in the winter months by data collected in the same way by Park Rangers. The year round data for 2009 forms the basis of this analysis.

Tourist trips on the lochs of the Park are catered for by 3 large firms, Sweeneys (Balloch), Loch Lomond Cruises (Tarbert) and Scottish Water, who run the boats on Loch Katrine. Information on visitor numbers and expenditure was obtained directly from these companies.

In addition to these three there are a number of smaller boat companies such as Macfarlane, who run the ferry to Inchcailloch (and the mail boat to Inchmurrin) as well as a substantial boatyard and hire business. There is also a small boat based at Luss that cruises the islands and a business offering power boat trips.

Water skiing takes place from Cameron House at the south end of the Loch and on Loch Earn from the water sports centre. Numbers on these trips have been calculated from the boat survey.

7.5.2 Estimating water-based activity day numbers

For Loch Lomond the following procedure was used:

- The mean annual number of boats on the water on weekend and weekdays between 12 and 2 was calculated from the boat survey
- The total number at the weekend and bank holiday periods was estimated by multiplying by 114 (52*2 +10)
- The total number on weekdays was estimated by multiplying by 251 (365-114)
- The two estimates were summed and then split into boat type using the percentages given in the boat survey.
- The number of people per boat was identified in discussion with experts
- The percentage of boats by type that would not be on the water between 12 and 2 was estimated. From the launch statistics at Millarochy and Balloch it appears that a significant majority of power/trailed boats were on the water at the survey time. On the other hand an equal number of trips by tour boats and ferries occurred outside the time and there were significant numbers of canoeists, wind surfers and jet skiers in late afternoon and evening.

Table 7.19 shows the final results for Loch Lomond.

Table 7.19 Boating: summary of activity days on Loch Lomond

	Surveyed Boats	Activity Days
Motor Cruiser	5,084	17,794

Speedboat	4,863	17,020
Day Boat	1,547	5,416
Jet Ski	1,326	2,334
Tour Boat	884	212,202
Ferry Boat	221	5,526
Canoe	2,653	5,729
Rowing Boat	442	1,592
Windsurfer	0	0
Dinghy	1,105	3,183
Yacht	1,105	3,095
Fishing Boat	2,874	8,046
Total	22,104	281,937
Motorised	15,694	50,610
Non-Motorised	5,305	13,599
Commercial	1,105	217,728

Figure 7.7 Boats by type

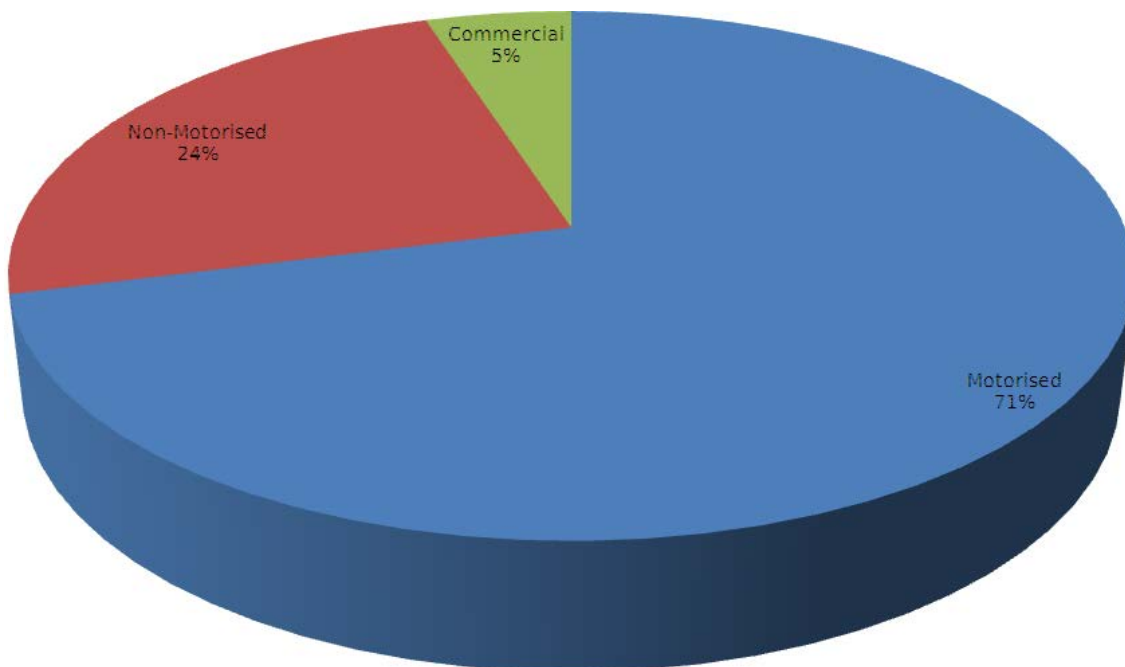
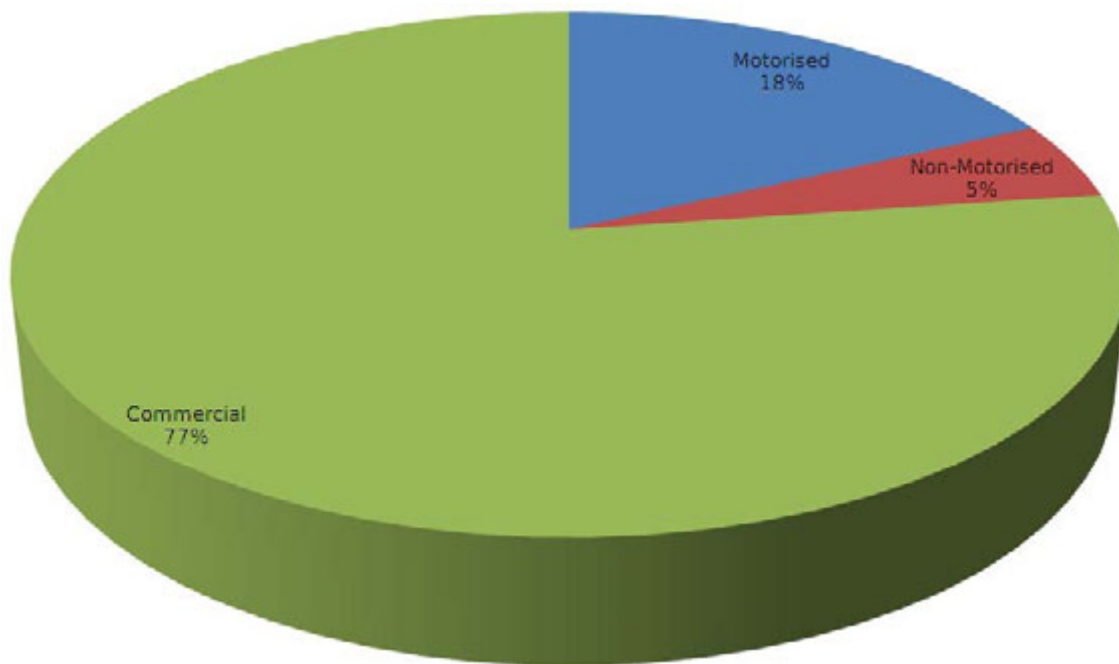


Figure 7.8 Activity days by boat type



What is striking is the number of “inactive” tourists and the very small contribution of non-motorised craft to the totals.

We now turn to the economic value associated with boating. There are broadly three categories; purchased boat trips, motor boat trips in own or borrowed boats; sailing/canoeing in own or borrowed equipment. Because so much of the demand is associated with coach tours at separately negotiated and unknown rates it is not possible to come up with an accurate price. On the basis of published prices less discounts we have assumed a mean price of £7 pp. We assume that there is no extraordinary profit i.e. that profits reflect a standard risk adjusted rate of interest on the significant capital of a fleet of boats.

Boat tours on Loch Lomond and Loch Katrine are a major business. The number of activity days has been estimated from the boat survey, published data (for Loch Katrine) and correspondence with tow of the major providers. Like so much of the data, it is not exact but likely to be of the right order of magnitude. The calculation of expenditure is even more inexact. Each company publishes timetables and ticket prices but a large proportion of tickets are pre-booked at specially negotiated rates by tour managers. A trip on the Loch is a staple part of the coach tour experience. Table 7.20 shows the range of trips and standard prices available

Table 7.20 Tour boat companies in the LLTNP

Company	Depart	Type	Price
Sweeneys Cruises	Balloch	1 Hour Experience	£8.00
		2 Hour Discovery	£12.50
		1 Hour Evening	£10.50
Cruise Loch Lomond	Tarbert	Ben Sunrise/Ptarmigan	£9.50
		West Highland Way Rambler	£14.50
		Inversnaid Explorer	£12.50
		Northern Highlights	£8.00
	Inversnaid	Tarbert	£9.50
		Rob Roy Discovery	£12.50
	Luss	All	£9.50
	Rowardennan	Balmaha Explorer	£15.00
		Luss Explorer	£10.00
Loch Katrine Experience	Trossachs Pier	Sir Walter Scott 2 hr Day	£12.50
		Sir Walter Scott 1 hr After	£11.50
		Lady of the Lake 1 hr	£10.00
		Lady of the Lake 2 hr	£14.50
		Evening 1 hr	£10.00

Without knowledge of numbers on each trip and discounts it is impossible to accurately assess expenditure. For the purposes of this exercise we have assumed that the mean price paid is £7. For the consumer the “value” of the trip is largely, if not wholly due to the scenery which elsewhere we have put at £6.49. Because tour boats are clearly commercial we have assumed that the consumer surplus (i.e. the value above what has been paid) is minimal.

For sailing/canoeing we have assumed the Hanley figure of £7.84 associated with the physical outdoor sports.

After purchase the major cost of motor boating is often berthing/mooring. Some locations are very expensive and boat usage very limited. In these cases it is difficult to identify benefits exceeding costs. Trailing motor boats to a slipway is quite possible but involves effort (Cost) that partially negates the savings from not having a mooring. With no data on owning and running a motor boat on lochs in the Park we have simply assumed physical costs and benefits equal at £25 per activity day and a nominal surplus of £5. We would be happy to adjust these if any evidence is forthcoming.

Taken together the costs and benefits of water activities in the Park are shown in the following table.

Table 7.21 Summary of boating activity, expenditure, consumer surplus and value

Activity	Loch Lomond	Other	Total	Price	Expenditure (£'000)	Surplus (£'000)	Value (£'000)
Motor	50,610	1,500	52,110	£25.00	£1,303	£261	£1,563
Non Motor	13,599	1,650	15,249	£0.00	£0	£119	£119
Commercial	217,728	72,000	289,728	£7.00	£2,028	£507	£2,535
Total	281,937	75,150	357,087	£9.33	£3,331	£887	£4,218

7.5.3 Fishing

Angling occurs throughout the Park and covers every type. In the West, Sea Angling is important on Loch Long and Loch Goil. Despite a steep decline in activity due to commercial over-fishing, a study by Radford and Riddington (2009) still estimated some 10,000 activity days in the north of the Inner Clyde Case Study area, which broadly coincides with the National Park. Boat Hire is available in Arrochar and Loch Goil, the last remains of what was once a sizeable industry.

Game fishing (Salmon, Sea Trout and Trout) occurs both in the rivers (see Section 3 Register of Assets) and on the main lochs. Coarse fishing is also popular both on the rivers and the loch. Boat hire is available throughout the area and it is noticeable how much angling is undertaken from Boats. There is one stocked trout farm in the Park.

In their 2002 Study Radford, Riddington and Gibson examined the economic impact of freshwater fishing in Scotland. The core of the study was a census of all fisheries in Scotland which resulted in a database of just under 3000. This was a mix of private fishing, which may or may not have paying guests and club fishing. There was also a small number that were not within a fishing development area and were consequently free.

From the 3000 data for the 39 fisheries within the National Park were extracted (see Appendix 2). The total number of activity days was calculated as 42,481. It should be noted that where a river flowed into the loch all fishing along the river was identified with the park area.

In addition to freshwater fishing the park also has saltwater fishing from locations on Loch Long, Loch Goil and the Holy Loch. Radford, Riddington & Gibson also studied the economic impact of this activity and one of their case studies was the Upper Clyde. They estimated around 10,000 angler days along the north of the area, which covers both the park area and also Helensburgh, the Gareloch and Dunoon. However the three charter boat businesses and two of the four sea angling shops are found in the park area. It seems that at least 50 per cent of the sea-angler days will be in the park giving a total of 47,481.

The water activity section of this report identified some 8,046 days freshwater angling from boats. With around 1000 boat based sea angling days it is estimated that around 19 per cent of angling is boat based.

Although sea angling has a significant economic impact via the retail and hospitality sectors, the economic benefit is wholly the consumer surplus. There has been no effort to sustain the natural resource that provides this surplus which over the years has declined in quality to a state where the asset value is unlikely to decline further. There is consequently no cost to put against the benefit and the value of the resource is this benefit. If the much discussed maritime park comes to fruition then we would expect a larger consumer surplus from increased quality and activity days which would be offset, at least in part, by the costs of the maritime park.

Whilst fishing for salmon has been controlled since the Middle Ages, freshwater angling for trout and coarse fish was freely available to the general public¹⁵. However, recognising the implications of the sharp decline in quality the river systems and the loch are now covered by licensing systems run by the Loch Lomond Improvement Association, the Tay FPA and the Earn FPA. In essence the price of salmon fishing normally covers Rent (a return for ownership of

¹⁵ Technically it is always a civil offence to fish without permission of the landowner but, like trespass, it is not worth the cost of a court case unless the usage is continuous and causes serious damage.

the asset) and the maintenance costs; whilst the price for coarse fish and trout normally only covers the cost of maintaining the asset.

In a study that looked at strategies for coping with the GS salmon parasite, Riddington and Radford looked at the WTP for freshwater fishing. For salmon angling on the River Luce they found Consumer Surplus of only £2.11 but a rent of £35.83 per day; an Economic value per day of £37.94. Note that over 80 per cent of this value goes to the landlord and the study found that this was not unusual. The greater part of the benefits from publically funded improvements tended to end up with the owners.

The report also used the Travel Cost Method to identify benefit and found net economic values ranging from £10.77 to £21.55. The difference illustrates the impact of ownership. A club would charge less, have more activity days and a higher economic value. A private owner would fix a rent that would maximise his profit, particularly if unused days were available for personal use.

Although salmon can be landed in all the catchments in the Park, they are very rare and consequently one would expect the rents and the consumer surplus to be much lower, of the order of £15. The consumer surplus associated with sea angling is similar at £15 per day.

For the purpose of this study we have assumed no rents and a consumer surplus of £20, i.e. £949,620. We assume that an average day rate of £10 which covers costs of maintenance and rents (£474,810). We further assume that the rent portion is £200,000.

Thus the total value of fishing is £949,620 (consumer surplus) plus £200,000 (owner surplus), **£1.1m in total**.

Table 7.22 Summary of fishing activities: benefits, costs and total value

Benefits	£ ('000)	Notes
Revenue	£475	47,481 activity days * £10
Consumer Surplus	£950	
Employee Surplus		
Owner Surplus	£200	
Public Health		
Total Benefits	£1,624	
Costs		
Rent, Maintenance & Admin	£475	Daily rate of £10 covering cost of maintenance & rent
<i>Includes Rent estimated at:</i>	<i>£200</i>	
Capital		
Total Costs	£475	
Total Value	£1,150	

7.6 Undefined mixed activities: including activities that take less than one activity day

Whilst fishing, golf or hill walking take up most of the day (over 4 hours), there are a number of activities that take less time, such as going for a short walk round Lomond Shores esplanade and/or woods and maybe enjoying a cup of tea coffee, going for a scenic drive or simply going for a beer in an attractive waterfront inn.

During the study it became increasingly clear that there was simply not any data to provide us with much more insight into what the bulk of visitors do in the Park. However as we examined the evidence 4 groups began to emerge from what we termed and some little evidence and the size of the residual provides some guidance on the size of these groups. The four groups are detailed in the following sections.

7.6.1 Picnickers

This group largely consists of family groups often with young children and limited income. The key requirements are an attractive parking location and somewhere to stroll and play, preferably with water. Typical destinations are the beaches on the west of Loch Lomond (Duck Bay, Luss and Firkin Point), those on the East (Millarochy, Cashell and Rowardennan), Balloch Country Park, Jubilee Point and Rubha Croise on Loch Eck and the beach car parks on Lochs Chon and Venachar in the Trossachs and at Ardentinnny on Loch Long. The value of the natural assets of the National Park is significant for this group. The numbers are not known and the best guess is somewhere around half a million visitor days.

7.6.2 Typical visitors

By far the largest group and possibly over 40 per cent of all visitors to the Park are a group who want locations that offer: Easy Parking, Short Walks, Refreshments and something to see and do. The most popular location, Lomond Shores, offers a number of short walks both within and adjacent to the site and attractions in the form of A Visitor Centre, A retail mall, an aquarium and an Historic Ship (The Maid of the Loch). In addition there are boat trips on the loch and canoe and cycle hire (with visitor days counted elsewhere). Meanwhile all these attractions are framed by a view of the Loch and Ben Lomond which is arguably the best in the UK.

Other popular destinations may also simply be scenic and picturesque towns and villages within the National Park, such as Aberfoyle, with its shops, hospitality and David Marshall Lodge attraction, Callander, with its shops, hospitality, Bracklin Falls, Falls of Leny and River Teith; Killin, with its shops, Falls of Dochart and Loch Tay; and Luss, with its picturesque buildings and church, hospitality and way-marked village walks.

However, such attractions (whether formal or informal) are usually not all-day destinations. For example, if we look at attractions that follow VisitScotland's definition, In 2009, visitors spent the longest time in Safari Park/Zoo/Aquarium/Aviary/Farm (at just under 2.5 hours) attractions and the shortest in Industrial/Craft Workplace (c. 40 minutes). On average, visitors spent 81 minutes at attractions in 2009 (Moffat Centre 2010). This leaves plenty of time for visitors to undertake possibly one or more other activities on their day trip.

As noted in the Assets Register, Chapter 4, there are 17 manned visitor attractions in the LLTNP which people visit to an "established excursion destination, a primary purpose of which is to allow access for entertainment, interest, or education; rather than being primarily a retail outlet or a venue for sporting, theatrical, or film performances." (Moffat Centre, 2010).

Of those, nine provided visits figures to the Moffat Centre/VisitScotland for the Visitor Attraction Monitor 2009, totalling 1.0m.

Table 7.23 Attendance at visitor attractions in Park

Attraction	Visits 2009
The Lomond Shores Gateway	328,204
Scottish Wool Centre	240,373
David Marshall Lodge	173,348
Benmore Botanic Garden*	52,063
Balmaha Visitor Centre	31,960
Inchmahome Priory	16,862
Breadalbane Folklore Centre	4,456
Moirilannich Longhouse	1,142
Hamilton Toy Collection	4,195
Total	852,603

Note: one operator requested their data remain confidential.

Whilst cruises were dealt with in the previous section and are not included here as they are considered as day long activities, Loch Lomond Seaplane advertises on its website it carried 6,000 visitors in 2010.

Finally, one cannot consider attractions without including Lomond Shores, which, as a predominantly retail-oriented attraction, does not fit within VisitScotland's definition, but is considered by visitors as a definite pull factor or destination. However, whilst one person or family could frequent Lomond Shores to have lunch, during the same day, this person or group could also enjoy the woodland trails located just behind the National Gateway Centre, take pictures of wildlife and statues, and visit one of the attractions such as the Sealife Aquarium, or go paddling with Can You Experience.

Estimates obtained from Lomond Shores show that it is frequented by just over one million people every year.

Table 7.24 Attendance at key attractions in Park

Attraction	Visits 2009 (‘000)
Lomond Shores	1,058
Visitor Attractions	1,105
Loch Lomond Seaplanes	6
Total	2,169

On the basis of known attendance at key attractions and at picturesque tourist-oriented villages and towns peppered throughout the National Park, we believe this group constitutes around 3 million visitor days. Within this group there is a high proportion of relatively elderly visitors who typically spend more than those involved in physical activities.

It is believed that the value arising from the Natural Assets of the Park for most of this group will be restricted to the lower end of that attributable to landscape as in such cases, the trip in itself carries more importance than the destination itself. Indeed, for this type of visitor, the destination 'National Park' could be in essence substituted for other destinations outside the Park such as Pitlochry, St Andrews or Ayr, which are unlikely to have substantially different valuations.

7.6.3 Wildlife enthusiasts

An important if small group are those particularly interested in the special flora and fauna of the Park. As a group they tend to less popular locations such as the National Nature Reserve at the mouth of the River Endrick. Walks of significant duration (if not length) are common. This group are likely to have substantial consumer surplus arising from the high value of the natural assets of the Park.

7.6.4 Landscape enthusiasts

A sizeable group are tourists who are interested primarily in the scenery and the views obtained throughout the Park. Stops are as likely to be in lay-bys to take photographs, as in well laid out car parks with picnic tables. The ideal destination would be a car park with a spectacular view such as Rest and Be Thankful or Duke's Pass possibly with a catering van for a cup of tea. We guess that there are around half a million day trippers/overnighters in this category. In addition there are 2.1m visitors who are passing through the Park to destinations in the north and west and obtain benefit from the scenery.

7.6.5 The value of activity days in the undefined mixed activities

On the basis of the above suppositions we obtain the following table.

Table 7.25 Breakdown and summary of the undefined mixed activities

	Number ('000)	% Undefined Mixed Activities	%Visitors	Notes
Total Visitors	6,998		100.00%	Drawn from traffic figures (Section 7.1)
Activities	926		13.3%	Drawn from adding up all activity days (land and water-based activities)
Transit	2,355		33.7%	Drawn from traffic figures (Section 7.1)
Total (Undefined Mixed Activities)	3,717	100.00%	53.0%	= Total Visitors - (Activities + Transit)
Picnickers	400	10.8%	5.72%	estimate
Typical visitors	2,672	72.0%	38.2%	See section 7.6.2 - includes visits to attractions as well as tourism destinations (villages, falls, walks, etc)
Wildlife enthusiasts	155	4.2%	2.1%	estimate
Landscape enthusiasts	490	13.2%	7.0%	estimate

WARNING: These figures are indicative only and largely based on supposition and comparison. For example the wildlife figures would include an elderly couple who have a stroll on the loch side and can distinguish that the "duck" is a Teal. Numbers of serious ornithologists is a small fraction of just over 150,000. However what is does show is that, as revealed in the survey of visitors to the NNRs the typical visitor is touring in a motor vehicle and stops for a short walk and a cup of tea.

The next step is to attach some value to each activity day undertaken by a member of a group. In general the natural Park environment is of fundamental importance and the value of landscape discussed in section 3.5.1.C of £6.79 is appropriate. The exception is the typical visitors group where elements of the built environment, some of which are paid for, would appear to restrict the consumer surplus. For this exercise we assume the consumer surplus in this case is 50 per cent of the landscape value. Thus the Net Economic Value of these multiple combined activities is as illustrated in the following table, totalling just over £16m.

Table 7.26 Consumer surplus and net economic value of the undefined mixed activities

	Activity Days (‘000)	CS	NEV (£’000)
Picnickers	400	£6.79	£2,716
Typical visitors	2,672	£3.40	£9,086
Wildlife	155	£6.79	£1,019
Landscape enthusiasts	490	£6.79	£3,327
Total Undefined Mixed Activities	3,717	£4.35	£16,180

7.7 The value of visitors in the National Park

This report is concerned with the economic value of the activities that occur within the park and the associated value of the natural assets that the Park Authority develop and manage. Unfortunately there is no estimate of the number of visitors to the park and the only activity survey is fundamentally flawed. However this project did not have either time or resources to carry out primary research and has thus had to establish this vital information by combining data manipulated and updated with expert opinion. The results reveal for the first time what is going on in the Park. Whilst it is clear there is likely to be significant error in these estimates we are convinced that the orders of magnitude are correct and provide good core data for the valuation.

7.7.1 Activities

In this section we summarise the number of days undertaken on specific activities undertaken by visitors. Normally we assume that for an activity like Hill-Walking the activity will be the focus and the whole day will be devoted to it (even if it only takes a couple of Hours). For less strenuous activities such as sightseeing or short walks, visitors undertake a number of activities. Consequently attendance at an attraction (or event) cannot with any real justification.

The following table presents estimated activity days for activities that are considered to last one activity day.

Table 7.27 Activity days for specified activities

Activity	Activity Days	Expenditure (£’000)	Surplus (£’000)	Value (£’000)	Data Method
Hill LD Walking	442,500	£150	£3,867	£4,017	Expert Calibrated
Water(Motor)	52,110	£1,303	£261	£1,563	Based on Boat Survey
Water (Non Motor)	15,249	minimal	£119	£119	Survey
Fishing	47,481	£475	£1,150	£1,624	Includes Fishing from Boat
Golf	48,595	£11,156	£5,017	£16,173	DREAM
Cycling	30,000	minimal	£133	£133	No Data
Tour Boats	289,728	£2,028	£507	£2,535	Survey and Opinion. Price set at £7
Total	925,663	£15,112	£11,054	£26,166	

In conclusion the story is that activities such as kayaking, whilst quite large in absolute terms are extremely small relative to recreation in it broadest sense.

7.7.2 Summary of value of activities

Table 7.28 brings together the net economic value of all the activities undertaken by visitors and “produced” by the assets of the National Park.

Table 7.28 Summary of value of activities (in £m)

	Expenditure (£m)	Surplus (£m)	Total (£m)
Defined Day	£15.1	£11.1	£26.2
Undefined Mixed	*	£16.2	£16.2
Accommodation & Hospitality	£90.4	£22.6	£112.9
Health Clubs etc	£7.1	*	£7.1
Retail	£30.5	*	£30.5
Other (admissions, hire, land tours, agents etc)	£12.9	*	£12.9
Total	£156.0	£49.9	£205.8

* The surplus from these activities from, in part, the surplus for the Undefined Mixed.

In total, therefore, it appears that **Visitor Services has a total value of around £206m**. We discuss in Chapter 10 how this is produced and who obtains the benefit.

7.8 Summary Value Tables

7.8.1 What produced the value

One of the objectives of this report is to try and identify the role of natural assets, also known as “ecosystems”, in generating value. The production functions that underlie the value generation process are complex and discontinuous and we normally simplify by assuming linearity with the contributions based on cost. In normal commercial activities such as providing accommodation, the payments to the factors (wages, interest, normal profits) will equal expenditure. One obvious approach is then to allocate the surplus (and abnormal profit) to natural resources. However this ignores other vital parts of the system such as Roads. Although it might be argued that road costs are covered (e.g. by business rates and corporation tax) it could quite reasonably be argued that the contribution of the road system to a business in a remote rural area is far larger than the norm and should be recognised in the account. Similarly it is argued in the text that the role of “scenery” in generating value in a hotel bears no relation to, and is in excess of, the consumer surplus. The same is true for tourists on boats (section 7.5.2) where the value of the scenery is far larger than the consumer surplus. Nevertheless simplification is essential and in dividing up the contribution we follow the following guidelines:

1. Wage Costs are allocated to human assets.
2. Depreciation is allocated to capital goods. IF not available interest is use as a proxy.
3. Rent is split between Built Capital and Natural Resources on the basis of depreciation.
4. Normal Profit is based on the normal interest on the face value of shares or some other measure of loans and allocated to Capital.
5. External built assets such as roads, slipways, railways are assumed to be wholly there for other reasons and no allocation is made.
6. Energy, material and services are separately noted.

Resource constraints have limited research into the cost structure of the value streams and, as with much in this report, some of the estimates are based primarily on opinion. At this stage the results should be viewed primarily as illustrative.

Table 7.29 provides an initial breakdown.

Table 7.29 The production of value of goods and services for visitors (tourism and recreation) in the LLTNP (in £m)

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Defined Day Activities	£13.7	£4.0	£5.7	£2.8	£26.2	£12.5	£13.7
Undefined	£15.4	£0.8	£0.0	£0.0	£16.2	£0.0	£16.2
Accommodation & Hospitality	£22.6	£31.7	£45.2	£13.5	£113.0	£90.4	£22.6
Health Clubs etc	£0.4	£1.8	£4.6	£0.4	£7.1	£7.1	£0.0
Retail	£3.1	£3.0	£9.2	£15.3	£30.5	£30.5	£0.0
Other	£0.4	£2.2	£6.4	£3.9	£12.9	£12.9	£0.0
Total	£55.6	£43.4	£71.1	£35.9	£205.9	£153.4	£52.5

Figure 7.9 shows the breakdown of the value between the identified activities whilst Figure 7.10 shows the contribution from each of the factors.

Figure 7.9 Breakdown of total value by activity (value stream)

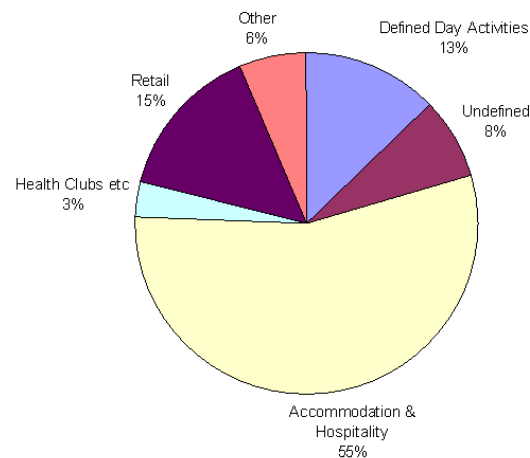
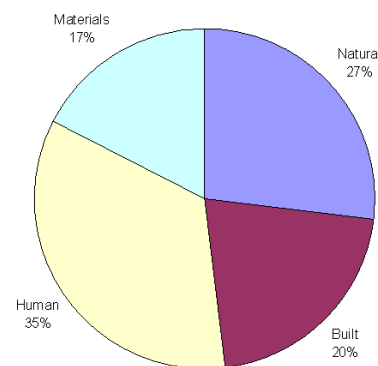


Figure 7.10 Breakdown of total value by asset



As might be expected, even after taking account the value of the free services offered in the park, the accommodation and hospitality sector is economically the most important component. However it is important to also recognise that this value might not be realised without the underlying activity; without the walk or beach or visitor attraction, the coffee shop would not get custom.

With regards to the recipients of the value, as might be expected in a service industry human resources dominate. However it is also clear from this chart that natural resources have an important economic role in the process.

7.8.2 Who received the value?

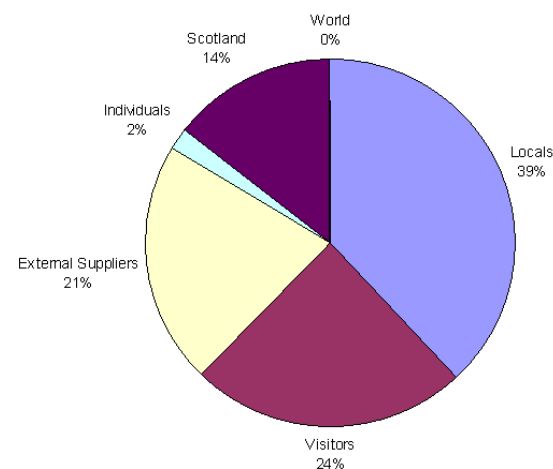
A second key question is then which groups receive the benefits of the value generated. It is fairly obvious that the recipients of any consumer surplus must be consumers i.e. in this case, visitors. The same is equally true if there is owner or employee surplus. Although a significant proportion of the employees commute into the Park, for this exercise we assume all are local residents. Similarly although some materials will be sourced internally, for simplicity we assume that all payments for materials etc are made to external suppliers. Rents are paid to identifiable persons and payments for capital items (refurbishment or replacement) are assumed to occur equally between local residents and external suppliers. Finally we assume that all VAT paid on expenditure finds its way back to Scotland. Utilising these assumptions we obtain Table 7.30.

Table 7.30 The recipients of value from goods and services for visitors (tourism and recreation) in the LLTNP (in £m)

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	External Suppliers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival & non-excludable goods
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Defined Day Activities	£26.2	£10.6	£11.0	£2.0	£0.0	£2.5	£0.0	£0.0	£0.0
Undefined	£16.2	£0.4	£16.2	£0.4	£0.0	£0.0	£0.0	-£0.8	£0.0
Accommodation & Hospitality	£113.0	£48.8	£22.6	£23.5	£0.0	£18.0	£0.0	£0.0	£0.0
Health Clubs etc	£7.1	£4.4	£0.0	£1.0	£0.4	£1.4	£0.0	£0.0	£0.0
Retail	£30.5	£8.5	£0.0	£13.4	£3.0	£5.5	£0.0	£0.0	£0.0
Other	£12.9	£6.0	£0.0	£4.0	£0.4	£2.5	£0.0	£0.0	£0.0
Total	£205.9	£78.8	£49.8	£44.3	£3.8	£29.9	£0.0	-£0.8	£0.0

Figure 7.11 shows the percentage breakdown of the recipients of this value.

Figure 7.11 Recipients of total value



Even with the inclusion of the value of free activities such as hill walking, the main recipients of the value of visitor activities are surprisingly, local people. Of course this is the group adding value by providing accommodation, food, smooth golf greens etc. In return they get wages. What might be surprising is the value received by the Nation in terms of VAT receipts on tourist activities.

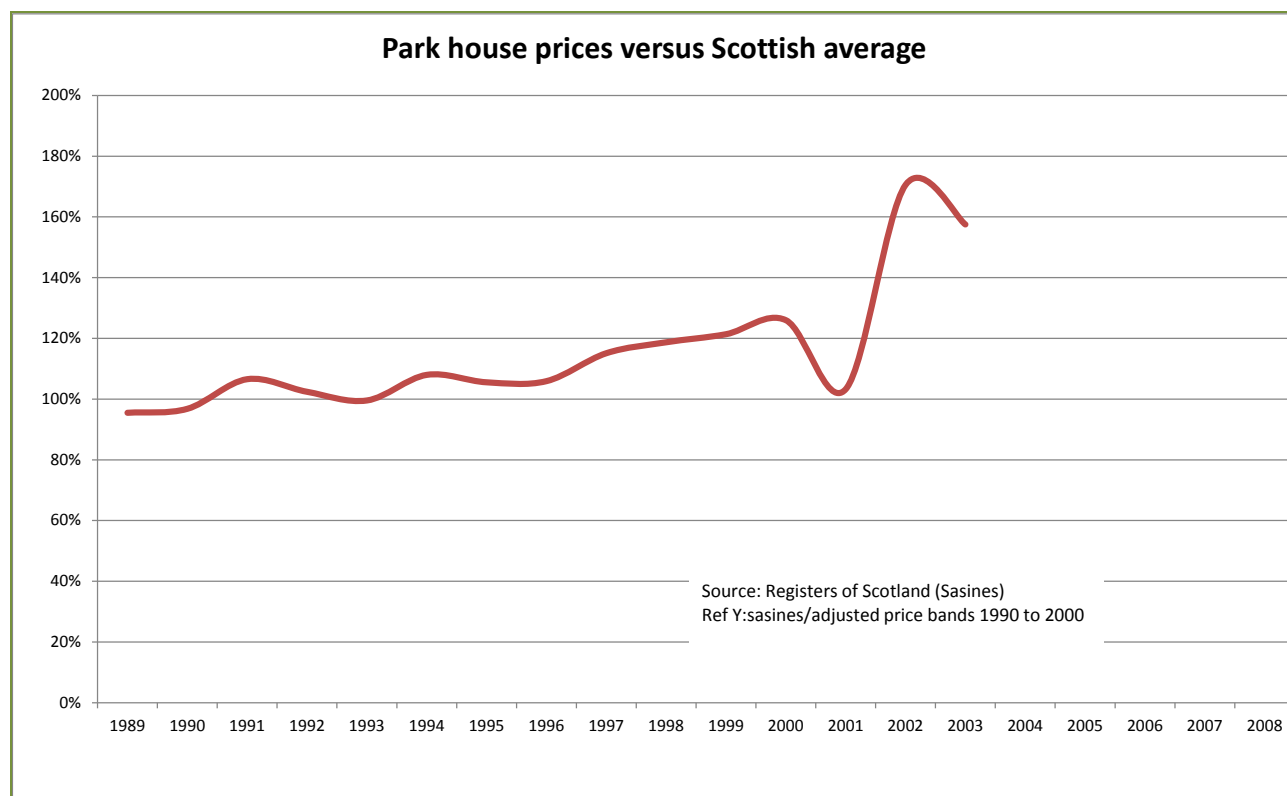
The final interesting element in the table is the speculative balancing item of just about £800,000. This represents the use made by visitors in general of car parks. Many of these were created with European Funds which are no longer available. Equally money for maintenance is in short supply so we might expect a general decrease in capital assets.

8 Production of local goods and services

8.1 Housing and construction

The value stream from housing is considerably enhanced by the high value of homes in the Park. Prices on average are significantly above Scottish average levels, but the structure of the housing stock and the market is so different from the national norms that it is not possible to make comparisons on a like-for-like basis without further study. The difference from Scottish average prices has fluctuated between a small discount to a 70 per cent premium, and has averaged about 16 per cent. Nevertheless, it is rising, and a 30 per cent figure is not unreasonable. The 30 per cent figure amounts today to £50,000 per property, and so would mean that over the Park's 6,500 houses the 'Park price premium' amounts to around £325m in capital terms.

Figure 8.1 House price differentials



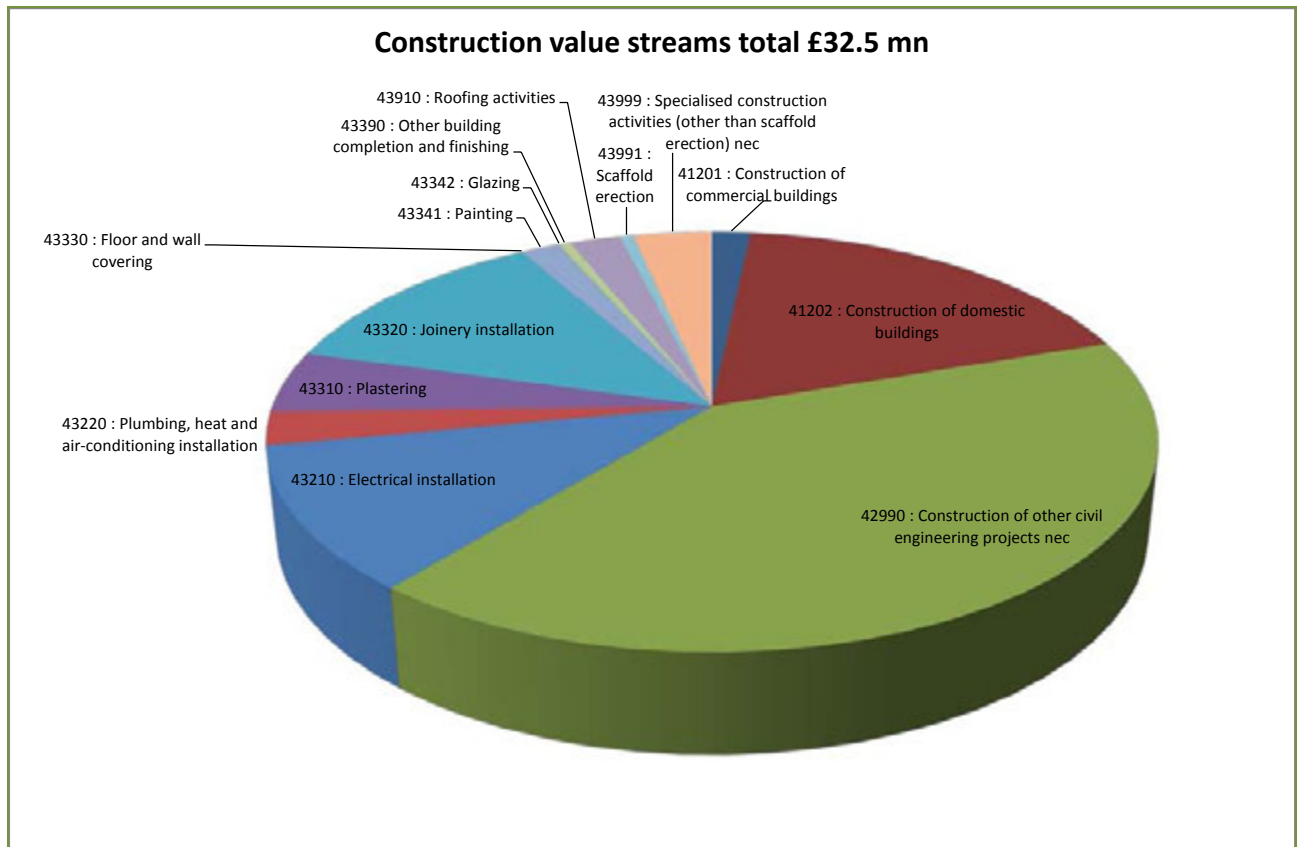
The relatively high turnover means that this is often realised by vendors (who then, of course, typically leave the National Park). Capital gains on housing sales fluctuate very substantially from year to year, as both the volume and price of houses goes up and down with the business cycle, but average about £250m per year.

These figures are very much higher than the figure included in the Regional Accounts for housing services (rental and imputed rental) which is only £58m, with value added of £21m.

The construction industry is divided roughly equally between (non-specialised) civil engineering and domestic house building with its trades, as shown in Figure 8.2.

In addition, it should be noted that a handful of people are employed in the gravel extraction industry, with a turnover of probably less than £200,000.

Figure 8.2 The shape of the Park's construction industry

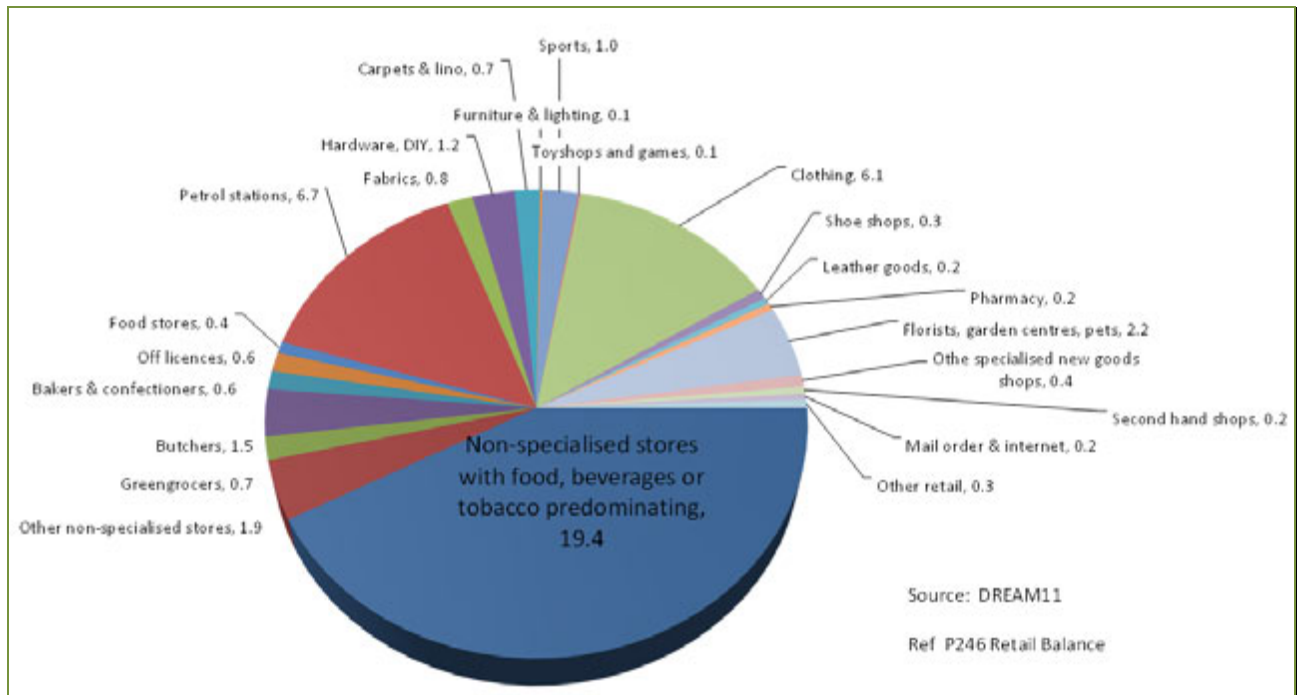


The GVA arising from construction is £13.7m. There are also technical and architectural consultants with value streams of about £5m. In many cases, and especially large construction projects associated with roads, water and water defences, and electricity the construction contractors used in the Park come from outwith the area.

8.2 Retail services

The turnover of shops in the National Park is estimated at £46m, made up as shown in Figure 8.3. The large sector in the pie included both supermarkets and convenience stores, which cannot be distinguished in the Standard Industrial Classification. In the National Park there are no hypermarkets, and non-specialised shops concentrating on food are relatively small, and deal overwhelmingly in food and household consumables, unlike larger outlets in towards Glasgow, which have a wider product range.

Figure 8.3 Retail turnover in the LLTNP (£m)



However only £20m of this turnover is estimated to come from local residents, if the estimates of visitor spending shown below are to be believed.

Table 8.1 Average spend per person per day (all respondents), Visitor Survey 2005, Lowland Research (2005)

	Total	Resident	Day Tripper	Short Break 1-4 nights	Longer Break 5+ nights
Base: All Respondents	2,626	444	877	596	709
Accommodation*	£23.93			£23.93	£23.93
Food and Drink (outside accommodation)	£13.28	£9.20	£6.53	£19.04	£19.33
Entertainment	£2.17	£0.94	£1.11	£2.58	£3.93
Tourist Shopping	£8.07	£3.15	£2.46	£9.80	£16.78
Transport within the Area	£3.16	£3.91	£1.76	£3.19	£4.59
Miscellaneous	£0.43	£0.10	£0.23	£0.64	£0.85

* Based on respondents spending 1 night in Loch Lomond and The Trossachs area in commercial accommodation

That level of tourism spending is itself lower than what was calculated by the researchers who carried out the visitor survey (Lowland Research, 2005). For the purchases of visitors and local people to balance, then we have had to reduce the tourism spending estimates. But even after this local residents appear to be purchasing two thirds of their food and 90 per cent of their other shopping outwith the National Park. The clothing shops in the Park, for example, cater primarily for the tourist trade, and petrol stations deal with the passing trade, with residents who commute tending not to buy in the National Park's four filling stations but in what they consider less expensive urban outlets,

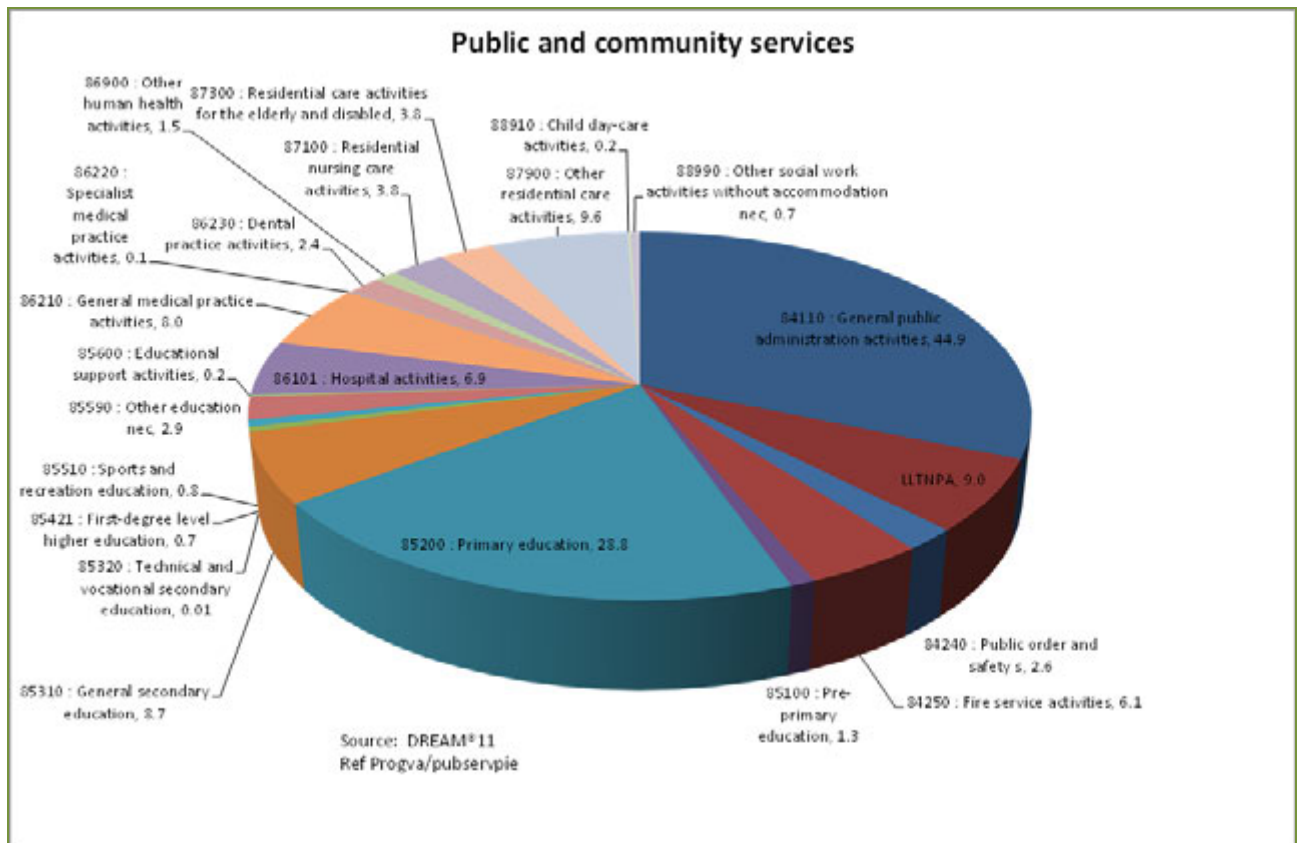
One of the special features of the Park's retail offering is the significant presence of specialised food shops, notably butchers, greengrocers and bakeries. Nevertheless they only attract about 15 per cent of food purchases, with the supermarkets and convenience stores taking the balance.

8.3 Public and community services

The value streams associated with government are as follows in this section. They total £143m in gross terms, and give rise to a GVA of £53m.

Most of these, of course, do not pass through the marketplace, and so they are an employment-based apportionment of the somewhat artificial national (UK) totals. Although Scottish Government and NHS statisticians have made substantial improvements in measuring the *trends* in healthcare and education productivity, their work is not yet advanced enough to address the total value of healthcare and education or its regional distribution.

Figure 8.4 Primary education and the local authorities dominate public service value streams



The administrative services of the local authorities comprise the largest single services, followed by primary education.

We have included the LLTNPA as a local public/community service (£9m value stream, £3.7m GVA) although of course its beneficiaries should be considered the Park's visitors, the Scottish nation, or an even wider community.

Primary education, primary medical care, and residential care are all substantially higher than would normally be found in an *economy* of this size, in part because the population is much bigger proportionally than the economy, but also because of the characteristics of that population. Secondary education and secondary medical care are small, essentially because the community is too small to achieve economies of scale, with the only secondary school being in Callander.

Public order (normally largely police and parking attendants) is smaller than usual, but the fire service is large, possible because of the forests and the large geographic area to be covered.

Some of the services recorded as community services may overlap to some extent with visitor services. The residential care sector is large (and as we have seen, the number of females in retirement homes makes a noteworthy contribution to the gender balance of the older population). More specialised care is normally received in a neighbouring district.

Overall what is noteworthy about services for local people, as opposed to both export services and services for visitors, is that they tend to be created rather than natural. They depend more on built assets, and they need inputs of work and (especially) purchased goods and services. This goes to show that life in the Park has many features in common with life elsewhere. The special features of the Park do not pass local residents by, but those residents have to get on with the normal business of living.

8.4 Summary Value Tables

8.4.1 What produced the value

Table 8.2 The production of value of local goods and services in the LLTNP

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Housing	£9.0	£9.0	£3.0	£37.0	£58.0	£12.0	£46.0
Housing - consumer surplus	£12.0	£0.0	£0.0	£0.0	£12.0	£0.0	£12.0
Construction	£1.4	£2.7	£9.6	£18.8	32.5	£32.5	£0.0
Architects etc	£0.0	£0.0	£1.5	£3.0	£5.0	£5.0	£0.0
Retail - local service	£0.0	£1.0	£4.0	£15.0	£20.0	£20.0	£0.0
Public and community services	£4.0	£9.0	£40.0	£90.0	£143.0	£20.0	£123.0
Total	£26.4	£22.2	£58.1	£163.8	£270.5	£89.5	£181.0

The largest components of the local value streams are housing and related building services, public services to residents, and public services to the Park itself.

Retail services to residents are relatively small, because residents tend to shop outside.. A large proportion of the services rely on purchased inputs, and the public services use a significant amount of human capital. Perhaps the most interesting features of the table are that the totals are relatively small and that more than two thirds of locally-oriented services do not go through the market.

8.4.2 Who received the value?

Table 8.3 The recipients of value from local goods and services in the LLTNP

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	External Customers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival & non-excludable goods
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Housing	£58.0	£58.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0
Housing - consumer surplus	£12.0	£12.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0
Construction	£32.5	£3.3	£0.0	£6.5	£0.0	£0.0	£0.0	£22.8	£0.0
Architects etc	£5.0	£0.5	£0.0	£2.5	£0.0	£0.0	£0.0	£2.0	£0.0
Retail - local service	£20.0	£10.0	£8.0	£2.0	£0.0	£0.0	£0.0	£0.0	£0.0
Public and community services	£143.0	£42.9	£14.3	£0.0	£0.0	£42.9	£0.0	£42.9	£0.0
Total	£270.5	£126.7	£22.3	£11.0	£0.0	£42.9	£0.0	£67.7	£0.0

Park residents draw almost half the benefit of local services, although we estimate there is a quarter spill-over to visitors and other non-residents.

The benefits of the Park Authority's efforts have been allocated as 50 per cent the Scottish nation and 50 per cent the Park's assets. A case could certainly be made for allocating some of the conservation effort to the global community/biosphere.

9 Production of global services

The fourth category of services includes those that relate to the aspirations and concerns of the world at large. Unlike other areas we have made no attempt to be comprehensive and most of our estimates are of the “heroic” variety. We have persisted with the approach, however, because we regard it as important to identify if a much flaunted value stream is worth of the order £1m, £10m or £100m.

The service provided fall into four broad categories

1. Public Health
2. Carbon Concentration
3. Species Variability.
4. Economic Development both within and outside the Park area

The public at large have expressed a willingness to pay to maintain or improve these and thus we assume that there is value. However no individual can be identified as a “User” and consequently we need to source a “non-user” or existence value for each.

Since the individual does not link the value to any “experience”, it seems logical that the valuation is not location specific; that the existence of a white whale has the same value if in Aberdeen or Alaska. However values are always contingent on the situation faced by the valuer. The beggar in the streets of Mumbai will place a rather different value on the continued presence of the Red Squirrel in LLTNP compared to a lawyer in Milngavie (who never ventures from an urban setting). However it is equally true to say that the islanders of Naurau (where 90 per cent of the population reside less than 5m above high water) possibly take more interest in global climate change than the average Scot. The result is that the relevant population considered varies, may appear rather arbitrary and is discussed in each section.

9.1 Public health

9.1.1 Introduction

A community builds a Gym or Sports Hall for two reasons:

- a) People enjoy exercise and are willing to pay for it;
- b) Exercise improves the health of that community (see, for example, Haskell et al 2010).

The value of the Sports Hall/Gym enters the books of the community as an Asset.

Parks, in general, have been defined as “Green Gyms”. In Chapter 4 and 7 we have identified the natural assets of the National Park that provide exercise opportunities and the amount of exercise undertaken. In Chapter 7 the willingness to pay for these activities (less the minimal costs) has been identified as the User Value of the natural asset. This value will include the personal value associated with good health.

In this section we seek to evaluate the additional value to the public in general of the improvement of health. We start by looking at evidence that the National Park does in fact improve health, then try to identify what the implication this improvement has on quality life years and finally calculate the resultant value.

9.1.2 LLTNP and health

This section is based on the data available at data zone level in Scottish Neighbourhood Statistics and data for local authorities available in the Scottish Household Survey.

The Scottish Index of Multiple Deprivation consists of seven “public health” measures; mortality rates, illness, birth weight, emergency admissions, depression and anxiety, alcohol problems and drug problems. The comparative position of the National Park and its local authority sectors for each of these is shown in the following figures.

Figure 9.1 Mortality ratio (standardised) in and around LLTNP and in Scotland

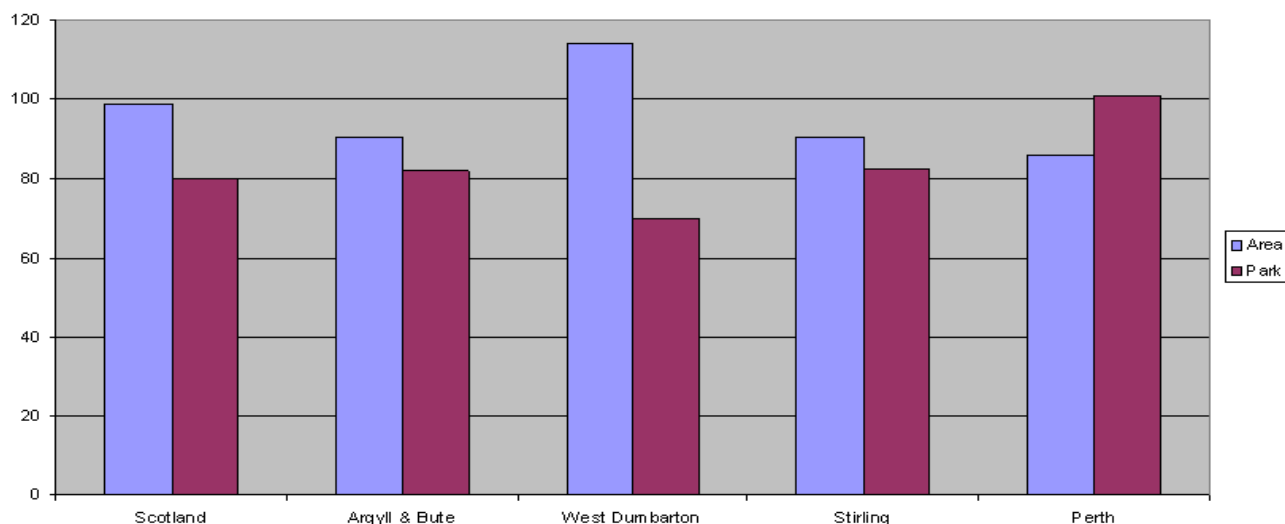


Figure 9.2 Comparative illness factor (based on benefit claimants) in and around LLTNP and in Scotland

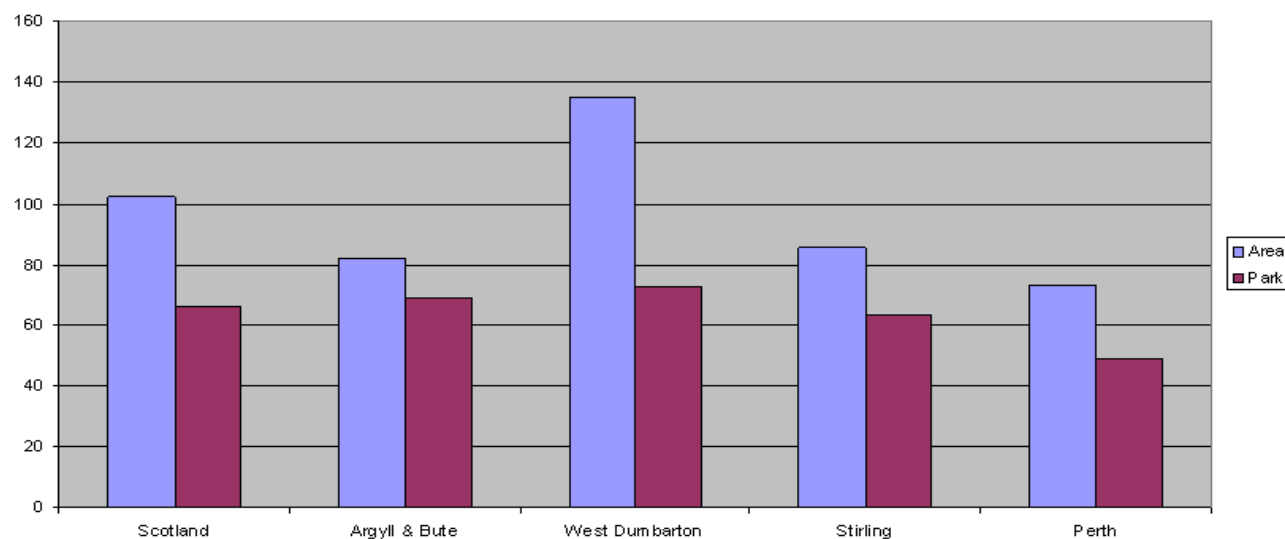


Figure 9.3 Percentage of births with low birth weight (<2.5kg) in and around LLTNP and in Scotland

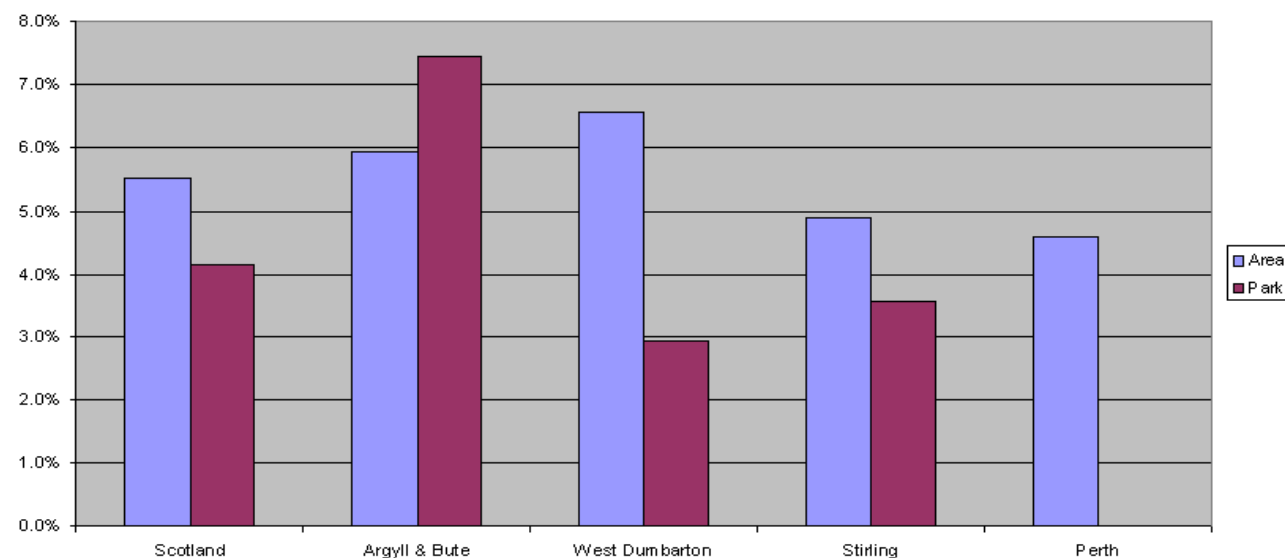


Figure 9.4 Percentage of population prescribed drugs for anxiety and depression in and around LLTNP and in Scotland

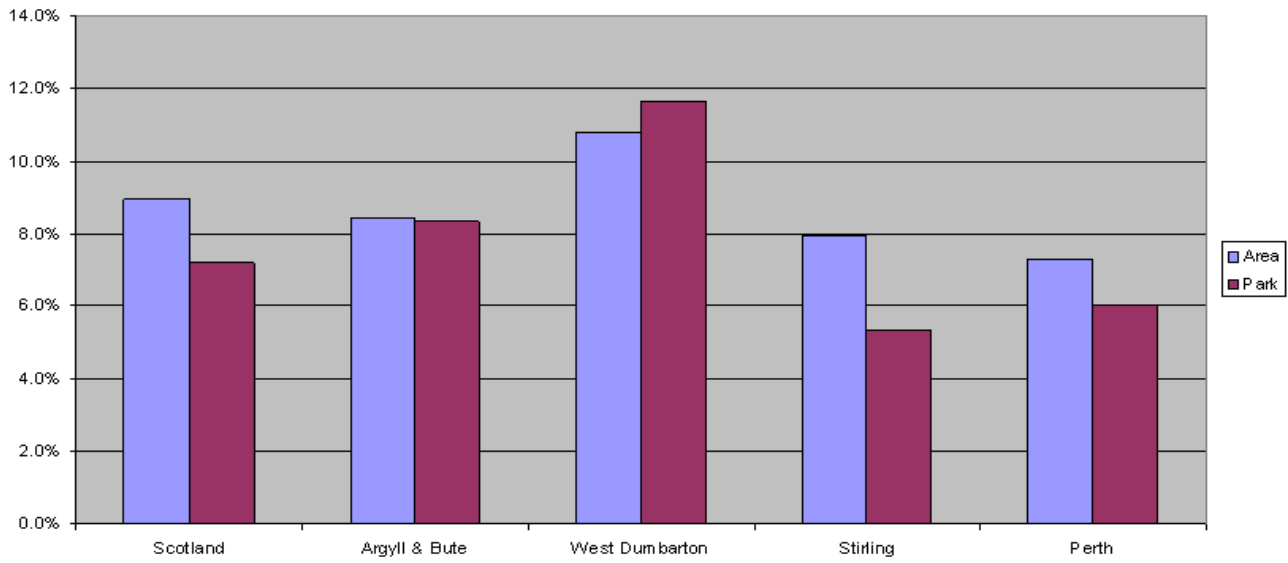


Figure 9.5 Emergency hospital admissions in and around LLTNP and in Scotland

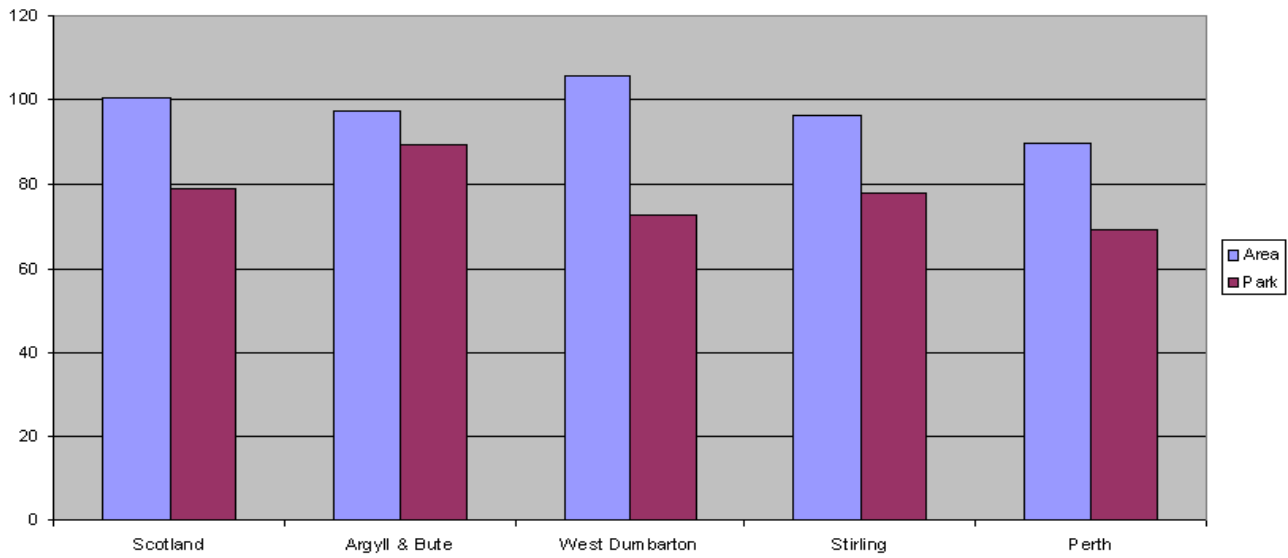


Figure 9.6 Hospital episodes relating to drug use (ratio) in and around LLTNP and in Scotland

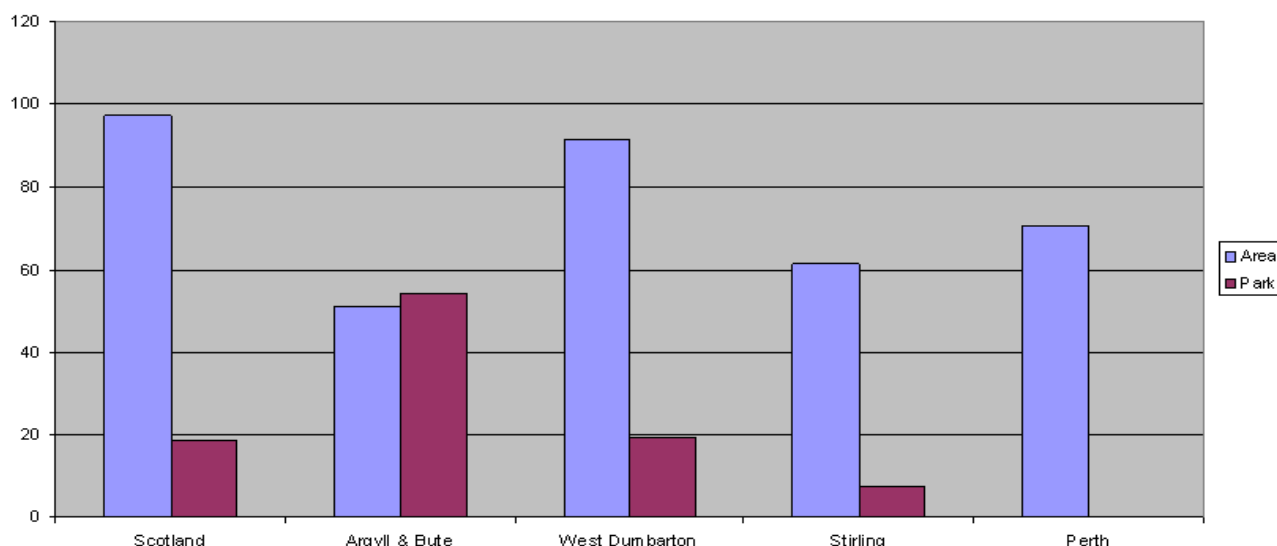
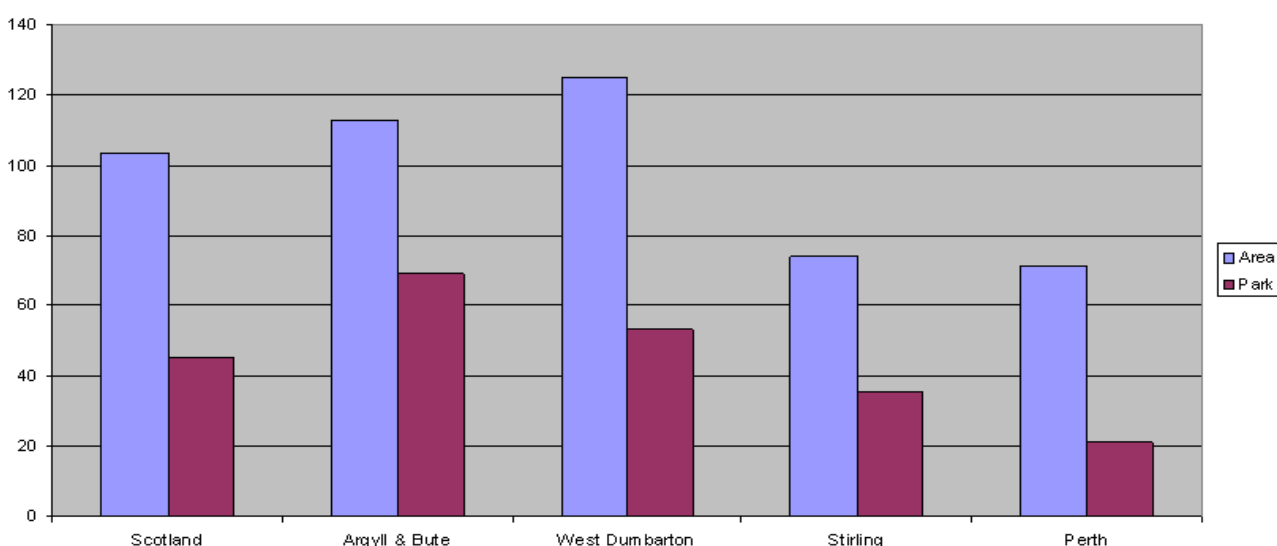


Figure 9.7 Alcohol problems in and around LLTNP and in Scotland



In virtually every case population within the park is substantially healthier than the rest of the local authority. In some cases the differences are quite dramatic, for example the difference in mortality rate between the middle class areas of Balloch in the Park and the rest of West Dunbartonshire.

To an extent these figures are both shocking and unsurprising. The Park with its beautiful environment and its need for high levels of personal mobility attracts the affluent. The correlation between income and health is well established; the poor die young. The fundamental question then is does the “green gym” aspect of the Park, with easy availability of excellent opportunities for exercise have any additional impact.

To test this hypothesis a simple model was built that looked at the relationship between the Index of Multiple Deprivation and what is termed the rank of income deprivation i.e. poverty. The additional factor was a dummy which took the value of 1 if the data zone was inside the LLTNP and 0 otherwise. Those partially in the National Park had a value equal to the percentage in the Park. The regression results are shown in Appendix 5.

The coefficient on the LLTNP (-411.654) is significant at the 5 per cent level and suggests that the simple fact of living in the Park causes a 7 per cent fall in ill health. **This is a fairly dramatic result and suggests very real substantial value in terms of health from the natural assets of the park.**

9.1.3 Health and exercise

The interest in the Scottish Government in levels of physical activity and health has resulted in extensive data in both the Scottish Health Survey and the Scottish Household Survey. Activity details are more extensive in the Health

Survey but unfortunately there is no locational information on the respondents which might help in identifying the impact of the Park¹⁶ so that this analysis is based on the Scottish Household Survey 2009. Table 9.1 shows the list of sporting activities considered. Participants were required to identify if they had undertaken the activity in the last month.

Table 9.1 Activities identified in the Scottish Household Survey

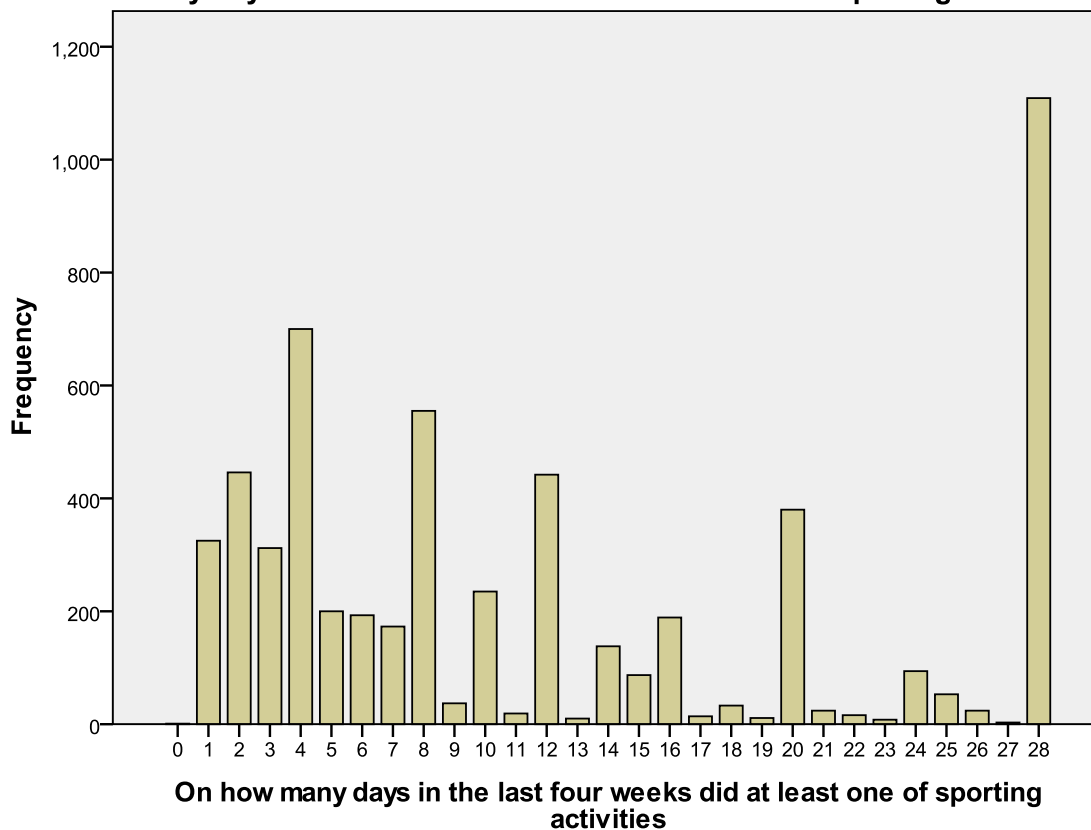
Walking (at least 30 minutes for recreational purposes)
Swimming
Football
Cycling (at least 30 minutes for recreational, health, training or competition purposes)
Keep Fit / Aerobics
Multi-gym use / Weight Training
Golf
Running / jogging
Snooker / Billiards / Pool
Dancing
Bowls
Other - please specify (e.g. Angling, Badminton, Judo, Horse-riding, Skiing, Sailing, Yoga)
None of these
Angling/bird watching
Racket/ball sports
Field sports (archery, shooting)
Water sports
Winter sports - curling, skating, skiing
Boxing, martial arts
Riding
Pilates, Yoga, Tai-Chi
Climbing, hill-walking
Other sports

Respondents were also asked the number of days sporting activity had been undertaken. Figure 9.8 shows the result for inhabitants in the West of Scotland.

¹⁶ This situation is set to change this year when the Health Survey provides details of the relevant Health Board.

Figure 9.8 Days sporting activities were undertaken in last four weeks

On how many days in the last four weeks did at least one of sporting activities



This chart clearly shows one group serious about exercise and undertaking it daily or close to it. The next group from 10 to 20 days could be identified as typical family members who enjoy exercise and go for long walks, play football or perhaps sail. The third group exercise in less 10 or less of the 28 days and constitute 54 per cent of the sampled population. For the purposes of the exercise we will define the groups as having High, Medium and Low activity levels.

An important associated statistic is that encouraging an extra day's activity per 28 days (13 per year) would shift 4 per cent of the group from low to medium status and 6.5 per cent from medium to high status. An extra 2 days is less dramatic; at 4.6 per cent and 6.7 per cent respectively.

Ferrucci et al (1999) examined the relationship between life expectancy, smoking and physical activity for those who had reached 65. Their results are summarised in Table 9.2.

Table 9.2 Relationship between life expectancy, smoking and physical activity for 65+

	Low	Medium	High	Low - Medium	Medium- High
Male Smoker	9.5	10.5	12.9	1	2.4
Female Smoker	11.1	12.6	15.3	1.5	2.7
Male Non-Smoker	11.0	14.4	16.2	3.4	1.8
Female Non-Smoker	12.7	16.2	18.4	3.5	2.2

This table suggests that moving physical activity of one person up a class adds 2.3 on average to quality adjusted life years.

9.1.4 The National Park and exercise

First it is important to note that in "Valuing the National Park" we are not trying to estimate the impact of the National Park Authority. If a body of water or a mountain area encourages exercise then the claim is that these are public assets that have real value for public health. Managing that asset to maintain its value is the task of the NPA.

The challenge in this section is a) to show that the assets in the National Park do encourage exercise and b) to then provide some guidance as to size of that encouragement and its subsequent value. The links between the stages are quite tenuous and it is recognised that the variance of any estimated mean will be large. Nevertheless in our view the results are of such a magnitude as to be important in determining priorities for the NPA.

The first task is to identify what activities in the Park might be associated with higher exercise levels. Table 9.3- Table 9.6 show the exercise days associated with individuals who undertake a specific activity. Note all the days will not be spent on that activity.

Table 9.3 Exercise days per month by walkers & climbers

Climbing, hill-walking	Mean	N	Std. Deviation
No	13.02	13444	9.760
Yes	15.41	32	9.231
Total	13.03	13476	9.759

Table 9.4 Exercise days per month by water sports participants

Water sports	Mean	N	Std. Deviation
No	13.02	13386	9.761
Yes	13.88	90	9.381
Total	13.03	13476	9.759

Table 9.5 Exercise days per month by recreational walkers

Walking (> 30 minutes)	Mean	N	Std. Deviation
No	7.30	2879	6.839
Yes	14.58	10597	9.854
Total	13.03	13476	9.759

Table 9.6 Exercise days per month by anglers/bird watchers

Angling/bird watching	Mean	N	Std. Deviation
No	13.04	13303	9.756
Yes	11.97	173	9.934
Total	13.03	13476	9.759

Recreational Walking for over 30 minutes is the dominant form of exercise with 78.6 per cent of respondents undertaking at least one such walk in the month in question.

It is believed that a family group walking up Ben Lomond would identify itself as participating in Recreational Walking rather than Climbing/Hill Walking. Those who do identify themselves in this way have significantly higher levels of exercise.

Of the activities typically undertaken in the Park area only those going Fishing or Bird Watching typically do less exercise than the norm.

These results suggest that providing opportunities to undertake activities, particularly walking, should increase exercise levels. Since the park does offer these, the next question is how important are they in increasing life expectancy. Ideally we would want to analyse the life expectancy of park visitors and compare with those who do not visit the park. However such data are not, and probably never will be, available.

Since the likelihood of visiting the park is a function of distance from it, a less than ideal alternative is to look at the life expectancy of populations in the local authorities that form the park with those outside it. This again is not available but the SHS does provide exercise levels by each individual. One major problem, however, is that the exercise level varies with the socio-economic status of the individual; for whatever reason the poor tend to take less exercise.

However from the available data we can obtain a model of exercise in the West of Scotland of the form

$EX_i = \alpha + \beta * SEC_i + \gamma * D_i + \varepsilon_i$ where EX_i is the number of exercise days taken by an individual i in a 4 week period, SEC is the socio-economic status of the individual, and D is a Dummy indicating if the home of the individual is in a "Park" local authority. α, β and γ are parameters and ε is the stochastic term.

The results are shown in Table 9.7.

Table 9.7 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	10.712	.332		32.253	.000
LA IN PARK	1.671	.371	.074	4.511	.000
NS-SEC analytic classes	.268	.077	.058	3.498	.000

a. Dependent Variable: On how many days in the last four weeks did at least one of sporting activities

Although the R-Bar Squared is low (9.5 per cent), the equation is highly significant as are the 2 parameters. What this model suggests is that the assets associated with the National Park induce 1.67 extra days of exercise. Of course it might be argued that this reflects the choice of this type of environment by people interested in exercise. But this should not, in itself, produce a bias, as visitors will undoubtedly have the same interests

From the discussion earlier an extra 1.67 days per 4 weeks would result in an increase of 4.4 per cent of the population from Low to Medium Activity levels and 6.65 per cent from Medium to High; just over 10 per cent in total. The next question is how many people would be associated with this.

The discussion earlier suggests that, when looking at the beneficial effects of physical exercise, the two most important groups are recreational walkers (1.55 days per month above mean exercise levels) and hill walkers (2.38 exercise days above norm). Section 5 estimated some 442,500 walking activity days on identified hill routes. To this should be added another 100,000 on obscure routes or linked forest trails and the small number of off road cyclists. If we assume an average walker goes out 3 times per year in the Park, the number of walkers was just over 180,000 per annum. From the discussion above 18,000 of these moved up an activity level because of the facilities offered by the Park.

9.1.5 The value of higher activity levels

Extensive evidence (e.g. Haskell et al 2010) shows that exercise and recreation are, in general, good for the physical and mental health of participants. One measure of that health is the Quality Adjusted Life Year (QALY) used in Health economics to evaluate procedures and drugs. Table 9.8 shows some estimates of the Willingness of the General Public to Pay for a single QALY.

Table 9.8 Value of quality adjusted life

Source	Value per annum	Notes
Nguyen(2011)	£30,080	Quoted as \$50,000
Philips (2011)	£20,000 to £30,000	
Transport Scotland (2011)	£30,375	Based on Value of Life with expectancy of 40 years and a real discount rate of 4%

In this section we use an estimate of £30,000. Thus if it were possible to show that annual total exercise by patrons of the LLTNP resulted in 100 additional QALY we could attach a Public Health Value £3,000,000 to the Park.

Since a move up an activity level results in 2.3 extra QALYs, each increase has a public health value of £69,000 per annum. However this assumes a continuum over the whole period. If we assume that increase in exercise is specific to the month,(and no other) or alternatively that the same commitment will occur over every period in the year then the total would be of the order **£95.5m**.

9.1.6 Discussion

The public want improved public health and are willing to pay for it.

Exercise improves Public Health.

Easily available facilities, whether natural (mountains) or built (Sports centres), increase likelihood of exercise and consequently public health.

All previous studies have concluded that trying to link the facilities to public health and consequently place a value on it is not possible with current information. It is attempted here.

Whilst we can be certain that the Park does have a significant public health benefit, the steps and assumptions used to estimate that benefit may be subject to criticism. The final figure could be half or treble the approximate £100m estimated. Interestingly this figure is four times the estimate of consumer surplus for walkers, which includes their valuation of the impact on their own health. However what is clear is that public health benefits are very large relative to consumer benefits and **MUST** have an important role in decision making.

Finally it is important to realise that these estimates are undoubtedly too low as they concentrate on physical health and ignore mental health. As shown in section 2, health problems relating to drug and alcohol misuse and to depression and anxiety are substantially lower in the National Park. A corollary is that the relaxation induced by recreation, even if passive, has a beneficial effect on mental health. Unfortunately we have no guidance as to even the magnitude of this effect.

9.1.7 Warning: use of total values in decision making

The value of the Park to Public Health is in some ways a peculiar concept. It places a value on things, such as mountains, that cannot be changed and the use is, as a consequence extremely limited in decision making. It is important that Total Values do not get used as proxy values for marginal values. For example a decision on the expansion of the Ranger service to promote hill walking will require evaluation of expected consumer surplus and an estimate of the **ADDITIONAL** public health benefit. This may well be of a totally different order of magnitude from the Total benefit.

9.2 Species variability

9.2.1 Introduction

The *Millennium Ecosystem Assessment (2005)* identified 3 service streams emanating from the ecosystem; Regulating, Provisioning, and Cultural. An essential element of provisioning is the maintenance and protection of genetic resources as exemplified by the conservation of rare species and environments. This section tries to evaluate the contribution the LLTNP makes to the world in providing an appropriate environment.

We considered two basic approaches; one which hypothesises that the effort (cost) put into species protection is commensurate with its value and the other which utilises willingness to pay studies undertaken elsewhere.

9.2.2 Cost based valuation

The key to this approach is the study by Laycock et al (2009) which examined the Cost-Effectiveness of a large number of conservation programmes for individual species. Interestingly the most expensive of these was for the Capercaillie, which is the focus of much of the conservation work in the LLTNP.

Table 9.9 Cost of implementing species action plans as calculated using social discount rate of 0%, 3.5% and 6%, where PV stands for present value

Species Action Plan	Cost (£)	PV cost (£)	
	d = 0%	d = 3.5%	d = 6%
Eyed longhorn beetle (<i>Oberea oculata</i>)	£500	£594	£669
Ground beetle (<i>Bembidion argenteolum</i>)	£960	£1,128	£1,270
Rove beetle (<i>Stenus palposus</i>)	£960	£1,128	£1,270
Short-haired bumble-bee (<i>Bombus subterraneus</i>)	£1,500	£1,663	£1,787
Weevil (<i>Melanapion minimum</i>)	£2,000	£2,145	£2,255
Pashford pot beetle (<i>Cryptocephalus exiguus</i>)	£2,500	£2,729	£2,906
Norfolk flapwort (<i>Lophozia rutheana</i>) ^a	£3,500	£3,643	£3,764
Jumpin weevil (<i>Rhynchaenus testaceus</i>)	£5,000	£5,362	£5,637
Lichen (<i>Calicium corynellum</i>)	£5,000	£5,362	£5,637
Leaf beetle (<i>Cryptocephalus nitidulus</i>)	£5,000	£5,458	£5,813
Six spotted pot beetle (<i>Cryptocephalus sexpunctatus</i>)	£5,000	£5,458	£5,813
Sandbowl snail (<i>Catinella arenaria</i>)	£4,630	£5,529	£6,254
Marsh moth (<i>Athetis pallustris</i>)	£6,000	£6,484	£6,851
Straw belle (<i>Aspitates gilvaria gilvaria</i>)	£7,550	£8,209	£8,717
Bast bark beetle (<i>Ernoporus tiliae</i>)	£10,000	£10,537	£10,937
Norwegian mugwort (<i>Artemisia norvegica</i>)	£10,000	£11,707	£13,152
Bog hoverfly (<i>Eristalis cryptarum</i>)	£12,000	£12,513	£12,890
Newman's lady fern (<i>Athyrium flexile</i>)	£10,000	£13,173	£15,957
Glutinous snail (<i>Myxas glutinosa</i>)	£12,000	£13,588	£14,878
Leaf-rolling weevil (<i>Byctiscus populi</i>)	£10,000	£19,909	£11,274
Shrill carder bee (<i>Bombus sylvarum</i>)	£16,750	£20,242	£23,097
Hazel pot beetle (<i>Cryptocephalus coryli</i>)	£20,000	£21,834	£23,251
Leaf beetle (<i>Cryptocephalus primarius</i>)	£20,000	£21,834	£23,251
Ramshorn snail (<i>Anisus vorticulus</i>)	£25,000	£27,011	£28,557
Blue ground beetle (<i>Carabus intricatus</i>)	£24,000	£29,049	£33,231
Narrow-mouthed whorl snail (<i>Vertigo angustior</i>)	£24,000	£29,173	£33,468
Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>)	£27,751	£31,200	£33,855
Whorl snail (<i>Vertigo geyen</i>)	£28,500	£34,305	£39,134
Deptford pink (<i>Dianthus armeria</i>)	£39,000	£44,195	£48,306
Fen orchid (<i>Liparis loeselii</i>) ^a	£34,000	£44,282	£53,256

Species Action Plan	Cost (£)	PV cost (£)	
	d = 0%	d = 3.5%	d = 6%
Ladybird spider (<i>Eresus cinnaberinus</i>)	£41,724	£45,757	£48,946
Yellow marsh saxifrage (<i>Saxifraga hirculus</i>)	£60,000	£77,719	£93,082
Native oyster (<i>Ostrea edulis</i>)	£76,335	£78,617	£80,277
Pool frog (<i>Rana lessonae</i>)	£84,202	£99,129	£111,378
Dormouse (<i>Muscardinus avellanarius</i>)	£169,854	£193,150	£211,830
Turtle dove (<i>Streptopelia turtur</i>)	£177,580	£202,896	£223,293
Vendace (<i>Coregonus albula</i>)	£218,000	£250,008	£276,976
Heath fritillary (<i>Mellicta athalia</i>)	£252,000	£292,831	£326,901
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	£805,000	£929,778	£1,033,122
Large blue butterfly (<i>Maculinea arion</i>)	£1,000,000	£1,173,139	£1,318,079
Natterjack toad (<i>Bufo calamita</i>)	£1,064,920	£1,229,865	£1,367,008
Grey partridge (<i>Perdix perdix</i>)	£1,640,000	£1,800,233	£1,930,286
Otter (<i>Lutra lutra</i>)	£2,800,000	£3,291,076	£3,695,819
Capercaillie (<i>Tetrao urogallus</i>)	£7,000,000	£7,550,116	£7,973,057

^a For these species, only data on the progress of the Species Action Plan in England were available.

No monetary benefits were attached although the identification of effectiveness did require some weightings of the extent to which conserving the environment of one species had positive impacts on the environment of others. These are shown in Table 9.10.

Table 9.10 Weights used to account for differences in utility between species, according to the added value that they provide

Species categories			Weight
Warm-blooded	Carnivores	Birds	1.00
		Mammals	0.92
	Omnivores	Birds	0.85
		Mammals	0.77
	Herbivores	Birds	0.69
		Mammals	0.62
Cold-blooded	Carnivores		0.54
	Omnivores		0.46
	Herbivores		0.38
Invertebrate	Carnivores		0.31
	Omnivores		0.23
	Herbivores		0.15
Plants/fungi/lichens			0.08

What this table shows is that protecting the environment for raptors means protecting the environment for a host of other species, whilst protection for invertebrates has little impact elsewhere.

Combining the two provided a measure of cost/effectiveness which ranged from £79 for the long eyed beetle to £808,000 for the freshwater pearl mussel. The Capercaillie was identified as the second most expensive program with a PV of just over £250,000.

Even if one is extremely sceptical about the precision of the figures the variance in the orders of magnitude is revealing. Some species are the subject of more study and more cost than others and are often associated with commercial interests (e.g. game birds and salmon rivers). It is difficult to suggest that they reflect the value of the species in the ecosystem and hence there appears little point in pursuing this approach.

9.2.3 The willingness to pay approach

The WTP approach is based upon protected areas. Under the Wildlife Act predecessors of Scottish Natural Heritage were required to protect areas where there is rarity value in terms of flora, fauna or geology. Those of national importance are identified as sites of Sites of Special Scientific Interest (SSSI). In accordance with the European Commission "Habitats Directive" (Directive 92/43/EEC) and the "Birds Directive" (Directive 79/409/EEC), Scotland

must also contribute to the development of a UK network of protected areas that represent the most important wildlife sites in the European Union, known as the *Natura 2000* (N2K) network.

This network is made up of Special Protection Areas (SPAs) classified under the Birds Directive and of Special Areas of Conservation (SACs) under the Habitats Directive. In Scotland, by 31/12/02, 355 N2K sites had been identified, comprising 223 candidate SACs (cSACs) and 132 SPAs, accounting for 9.3 per cent of Scotland's land surface. As 55 sites are both cSACs and SPAs, there are actually 300 separate individual N2K sites. Not surprisingly there is considerable overlap with the network of SSSIs.

IN 2004 a study was carried out by Jacobs (2004) on the Costs and Benefits of the *Natura* network. As discussed earlier the conventional framework uses **Total Economic Value** (TEV). This divides the welfare value ascribed to a good, service or system into **direct use**, **indirect use** and **non-use** values.

- **Direct use values** assessed in this study predominantly relate to general (e.g. walking) and specialist (e.g. angling) recreational visits to N2K sites. This value is based on the amount of money individuals are willing to pay for the policy-on scenario relating to their use, over and above what they do pay to visit the sites; In the LLTNP the Use Values from visitors are assessed within the section which identifies **Services to Visitors**.
- **Indirect use values** relate to functions such as pollination, water storage and flood protection, regulated by the NPA and other planning bodies. These values are a significant part of the benefit of these bodies identified within **Local Services**.
- **Non-use values** can arise irrespective of any such use. They relate to the fact that people are willing to pay to protect environmental resources so that other people can use them and just so they personally know the resources will continue to exist. In the *Natura* study, non-use values were estimated for the general public and visitors to Scotland through WTP questionnaire surveys. Care was taken to exclude the non-use value held by visitors to the sites from their WTP values, so as not to double count non-use value. These Existence Values are the value associated with **Global Services**.

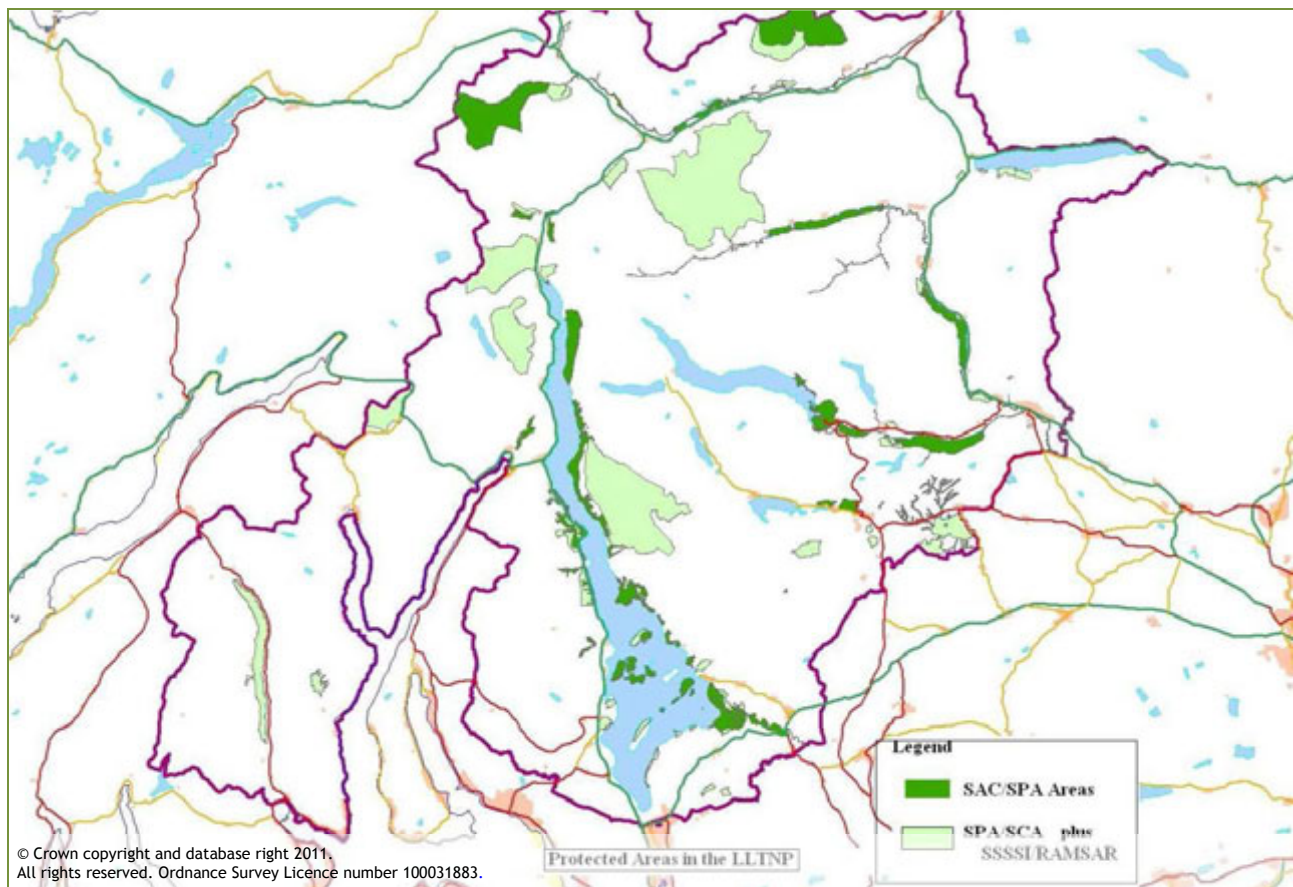
The *Natura* study focused on seven case study areas, chosen to represent most types of environment rather than proportionate to area. These are shown below.

Table 9.11 Case studies of the *Natura* study

Area Name	Location	Individual Site Name	Habitat type	cSAC	cSPA
River Bladnoch	Dumfries & Galloway	River Bladnoch	River	✓	
Clyde Valley Woods	South Lanarkshire	Clyde Valley Woods	Woodland	✓	
Waukenwae Moss & Red Moss		Waukenwae Moss	Bog	✓	
		Red Moss	Bog	✓	
Sands of Forvie Area	Aberdeenshire	Sands of Forvie & Ythan Estuary	Coastal	✓	✓
		Buchan Ness to Collieston	Coastal	✓	✓
Tips of Corsemaul & Tom Mor		Tips of Corsemaul & Tom Mor	Inland hills		✓
Strathglass Complex	Highlands	Strathglass Complex	Mountain	✓	
Lewis & Harris	Lewis & Harris	Lewis Peatlands	Peatland	✓	✓
		Harris Mountains	Mountain	✓	✓
		Grimersta River	River	✓	
		Ness & Barvas	Farmland		✓

Figure 9.9 shows the *Natura* (SAC/SPA) areas in the LLTNP and the SSSIs where they cover additional areas. For the purposes of this study the SAC/SPA protected areas are included and the benefit is assumed to be directly proportionate to the benefit found in the Case Studies.

Figure 9.9 Protected areas within the LLTNP



The study found major differences in non-use WTP associated with the number of N2K sites within the case study area, as well as the type of habitat and key species being protected. Per habitat type, the differences in non-use WTP are relatively small. Nevertheless, although there are “favourite” habitat types, respondents gain value from protecting all types of habitat. Although it is the number of sites rather than the total area that generates the differences, site definitions themselves may be chiefly a function of history rather than environment. On Loch Lomond for example, each island, the estuary and the Cashell woodlands could be identified as a separate sites since they are often important for different species, have different geologies and have different use patterns. Table 9.12 shows the identified existence value for the seven areas.

Table 9.12 Natura study: existence value

Case Study Area	Existence Value
Bladnoch	£1,184,934
Clyde Valley Woods	£1,811,015
Waukenwae and Red Moss	£2,526,052
Sands of Forvie	£2,384,608
Tips of Corsemaul & Tom Mor	£1,230,901
Strathglass	£1,454,493
Lewis and Harris	£4,875,534

These estimates have been criticised. As an example Lewis and Harris, with 41,000ha has only double the value of Sounds of Forvie at 1000ha. Nevertheless the data is undoubtedly the best available. For all 300 sites the study estimated an existence value of £210 million, which is 99 per cent of the total assessed value. These significant non-use values, in the order of £48 per year per Scottish household were thought to be not that unreasonable when compared to other valuation studies. For example, Hanley et al (1996) derived Scottish household WTP values of £97 per year and £62 per year to maintain Machair ESA and Breadalbane ESAs respectively, much of which was non-use value.

The visitor to Scotland non-use value of £6 per adult visit to Scotland to protect all 300 N2K sites is also likely to be a reasonable value. However, it is not possible to compare this to any other similar type of valuation study due to the lack of similar valuation contexts.

To simplify estimation of the value of the sites in the National Park we assume that they have the Scottish average value per hectare. The area of these sites was then calculated using GIS.

The total area of the 300 sites is 7,326 km², some 9.3 per cent of the total area of Scotland. The area within the LLTNP is 327km² some 4.4 per cent of the conserved area in Scotland. Assuming the value per hectare is roughly similar for each area this gives an Existence Value of £9.4m in 2004 prices, **£11.3m in 2010 terms**. Although substantial this is still dwarfed by Public Health benefits from the Park.

9.3 Carbon sequestration and pollution

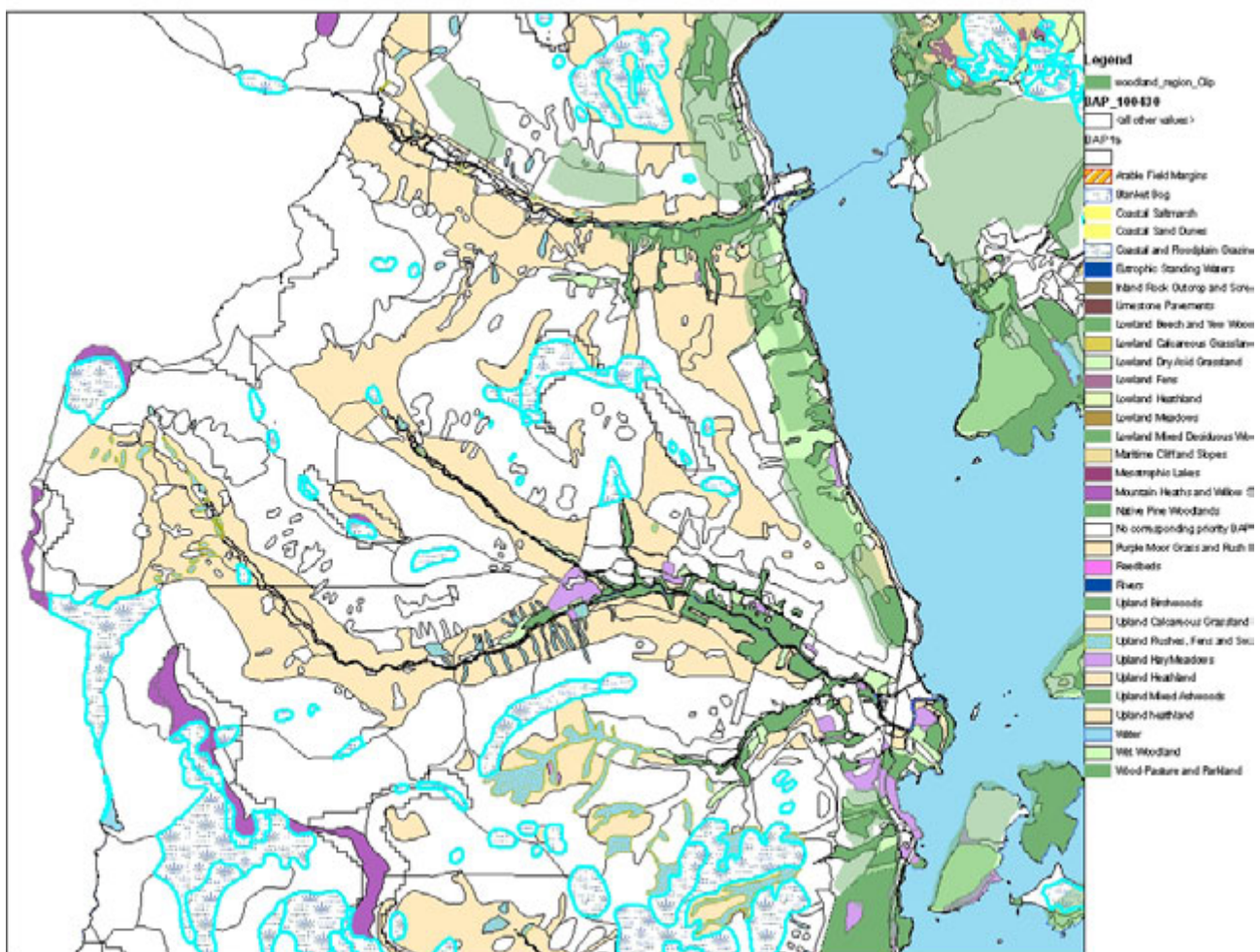
Where Parks are the lungs of towns, National Parks have a vital role as the lungs of the nation. The LLTNP has an important role in two areas:

- By maintaining forest and peat bog areas it acts as a carbon store. Based on the price of carbon permits, maintenance of these has a clear and important value.
- By providing sites for non-carbon based natural power generation from hydro electricity from large schemes such as Loch Sloy as well as small river flow systems, the LLTNP has a clear and important value.

Sections 6.3 And 6.5 considered the value of Forestry growth and of hydro electricity and *inter alia* the value of carbon acquisition and carbon replacement. In this section we look at the value of forest residue and peat bog as a carbon store.

Plant growth, particularly woody plants have large carbon content and absorb carbon during growth. They largely retain that carbon unless chemical reactions occur (such as burning) that release the carbon back into the atmosphere. During the carboniferous period large volumes of woody material disintegrated. In some cases the layers were trapped by rocks and were compressed to form coal. In other cases the material lay on the surface in the form of Peat. The Park contains large areas of what it terms Blanket Bog. Figure 9.10 shows detail with the Blanket Bog outlined in Blue.

Figure 9.10 Detail of land use by Glen Luss



Totalling all the Blanket Bog in the National Park gave a total of some 213,689,095 m² (21,368 hectares or 213 km²); a very substantial area. Because the depth of the peat is unknown it is not possible to state the likely volume of carbon stored in the peat.

In addition the ground/root area of forests either existing or felled contain substantial volumes of stored carbon.

Together it is clear that these areas are important as a store but the main question is the Value. In one sense the areas are Assets in providing potential energy for a demanding community. On the other hand they are liabilities; any consumption is a loss in the fight to capture carbon. However in the context of the Comprehensive Account the store value of existing Peat neither adds nor reduces value whilst it remains simply an untouched store.

There is however change. When disrupted in the construction of a wind farm, hydro scheme or equivalent then the value (or cost) needs to be considered. Equally when untouched, Peat is expected to grow by 1mm per annum (Sears and Janson, 1933) estimated 20-30 years to lay down 1 inch (25.4mm), a tiny depth but over 213 km² a not insubstantial volume of 213,689 m³. Hall (2006) suggests that the carbon content of dry peat is 55kg/m³, which suggests 147,232 tonnes of carbon are captured in the Peat per annum. At £16 per tonne this gives **an annual value of £2.4m.**

With regards to carbon sequestered by trees in the LLTNP's forests and woodlands, trees are estimated to grow by an annual increment of approximately 450,000 m³ per year (out of 21m m³ in the UK) and, although the quantity harvested varies significantly from year to year according to market conditions and the readiness of particular tracts, harvest is typically 350,000 m³. (These estimates draw upon (Forestry Commission, 2010a) and (Forestry Commission, 2010b)). Thus the growth of timber approximates to 90,000 tonnes of carbon, but the proportion not harvested is about 20,000 tonnes. (these factors are taken from (Backeus, Wikstroem, & Laemaas, 2006).

The UK Budget on 25 March 2011 set the floor of the UK carbon price at £16 per tonne, set to rise to £30 per tonne by 2020, a figure which is designed to encourage renewable investment. **Thus the value of the carbon being captured by the Park's forests is £7m rising at about £1m per year.** What the net impact of this is on the world's carbon economy depends to an extent on what happens to the trees and, if they are felled, what other materials or fuels they replace in what uses. For example, if they are burnt as fuel then the carbon is re-released to the atmosphere, but provided the transportation requirement is small, less may be released than would have been from coal, gas or oil that wood fuel replaces. If the timber is used for construction then if it substitutes for steel or plastics the coal used in the steel process and some of the gases released from the hydrocarbons in the plastics supply chain are saved from being emitted. But if the wood goes into paper or packaging that is burnt without the energy being captured there is no carbon gain.

Given the Park's objectives, it is appropriate for the LLTNP to maintain a dialogue with the Forestry Commission and other forest owners and operators on these issues. A working estimate for the annual benefit from the net annual increment is £5m.

9.4 Economic development in Scotland as a whole

9.4.1 The halo effect

The creation of the Loch Lomond and The Trossachs National Park was thought to have four major economic results measurable in market terms in the Park itself:

- a) Increased relative demand by the public (compared to similar rural areas elsewhere in Scotland), primarily for recreational use and for housing
- b) An increase in public and private investment in visitor facilities of all sorts to meet this demand
- c) Changes in relative economic activity within the park area; mainly increases due to extra demand and capacity, but some reductions on conservation grounds
- d) Increase in prices, notably property prices and rents (The Owner Surplus) as a result of
 - Limitations in capacity in the face of increased demand, especially if these limitations were reinforced by restrictions on development
 - Increased surety of maintenance of environment

The expected impact on the area immediately around the National Park was much less clear. Some argued that designation would:

- a) Divert investment away from these areas into the park;
- b) Divert visitors into the park;
- c) Reduce economic activity.

On the other hand the general consensus was that the attractions within the Park would act as a stimulus to businesses outside that supply either businesses in the Park or visitors to the Park. This positive effect has been termed the Halo effect and this section tries to identify if there is such an effect.

A. Economic background

The first task consisted in defining the Halo.

One potential definition is utilising the local Tourist Board area; namely Argyll, Loch Lomond and Forth Valley (ALLFV). Figure 9.11 shows the boundaries of the Tourist Board area and that of the National Park.

Figure 9.11 Argyll, Loch Lomond & Forth Valley area tourist board and National Park area

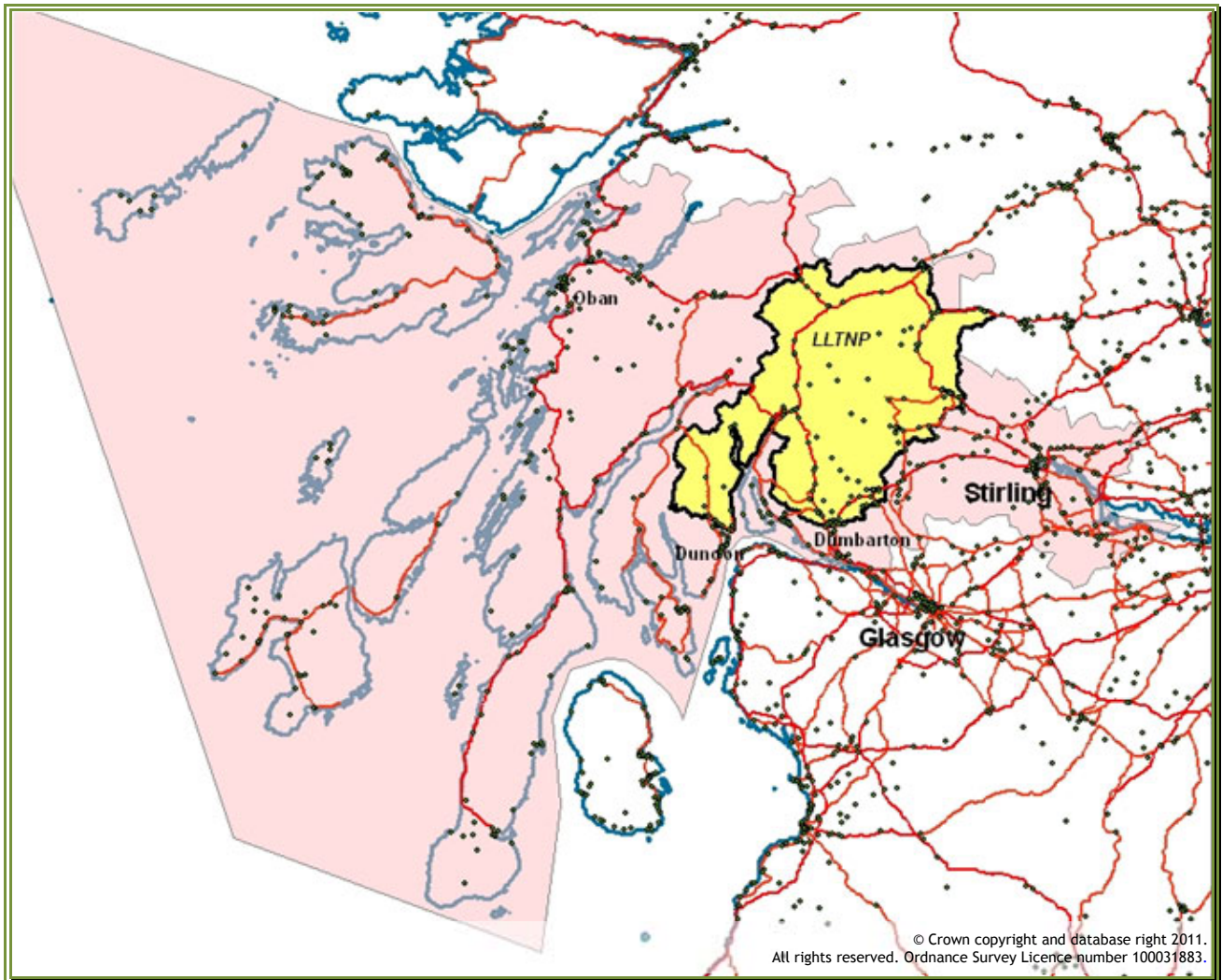


Table 9.13 shows overnight visitors to Tourist Board Area 2005-2009 and our estimates of all visitors (overnight and day-tripper) to the National Park through the A83 gateway at Balloch over the same period. This suggests that whilst tourism in the general area has been stagnating - and even declining; it has been increasing in the National Park. In turn this would tend to suggest economic diversion to the National Park area.

Table 9.13 Tourism trends in Argyll, Loch Lomond and Forth Valley tourist board area and traffic estimates

	2009 ⁽¹⁾		2008 ⁽²⁾		2007 ⁽³⁾		2006 ⁽⁴⁾		2005 ⁽⁵⁾	
	Trips (m)	Expenditure (£m)	Trips (m)	Expenditure (£m)	Trips (m)	Expenditure (£m)	Trips (m)	Expenditure (£m)	Trips (m)	Expenditure (£m)
England	0.75m	£202m	0.82m	£201m	0.84m	£197m	0.89m	£213m	0.85m	£130m
Scotland	0.75m	£107m	0.77m	£115m	0.79m	£113m	0.79m	£118m	0.77m	£188m
N. Ireland	0.03m	£13m	0.03m	£10m	0.03m	£10m	0.02m	£3m	0.02m	£7m
Wales	0.02m	£7m	0.02m	£3m	0.02m	£3m	0.02m	£3m	0.03m	£17m
Total UK	1.57m	£325m	1.64m	£329m	1.68m	£323m	1.72m	£338m	1.67m	£342m
Overseas	0.29m	£83m	0.29m	£89m	0.30m	£103m	0.30m	£94m	0.30m	£81m
Grand Total	1.86m	£408m	1.93m	£418m	1.98m	£426m	2.02m	£432m	1.97m	£423m
Traffic Counter	3.10m		2.97m		3.32m		3.32m		2.93m	

⁽¹⁾ VisitScotland (2010) *Tourism in Western Scotland 2009*. www.visitscotland.org/pdf/vs_western.pdf

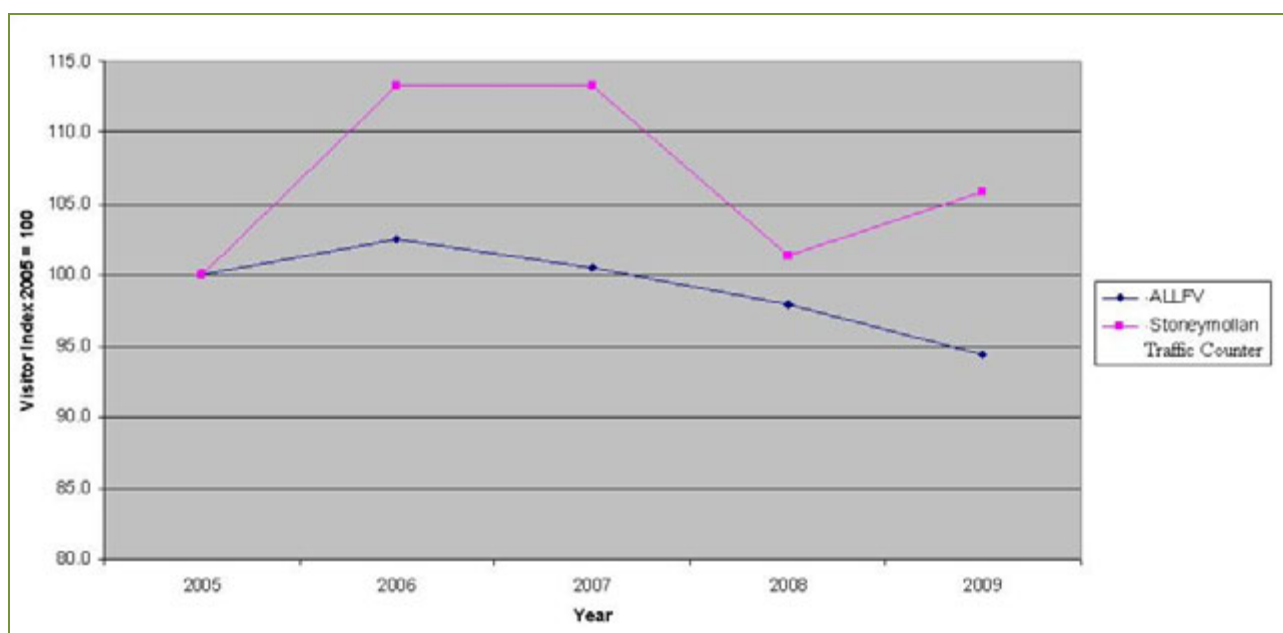
⁽²⁾ VisitScotland (2009) *Tourism in Argyll, The Isles, Loch Lomond, Forth Valley 2008*.

⁽³⁾ VisitScotland (2008) *Tourism in Argyll, The Isles, Loch Lomond, Forth Valley 2007*.

⁽⁴⁾ VisitScotland (2007) *Tourism in Argyll, The Isles, Loch Lomond, Forth Valley 2006*.

⁽⁵⁾ VisitScotland (2006) *Tourism in Argyll, The Isles, Loch Lomond, Stirling & Trossachs 2005*.

The following figure illustrates the above table in index form (2005 = 100)

Figure 9.12 Tourism trends in Argyll, Loch Lomond and Forth Valley Tourist board area and traffic estimates

However the ALLFV area is very broad and includes traditional seaside holiday locations such as Campbeltown, Helensburgh, Oban, Rothesay and Dunoon that have been in serious decline for a number of years¹⁷ and the heavily urbanised areas around Clydebank and Falkirk. Ideally, therefore, we need to examine the impact for far smaller adjacent areas for which official data does not exist and a new data sources need to be developed.

One possible indication that Park status is seen by businesses as a positive factor in the decision processes of visitors would be its occurrence in the publicity for the business. If the halo effect occurs then we should expect it to be obvious in accommodation publicity.

In the following sections we examine the relative incidence of mention of the LLTNP at different distances and by a number of other possible factors such as size and location within the park.

B. The data

The web has now become the dominant means of publicising accommodation and offers an effective way of examining the role of the LLTNP in that publicity. Five local databases were examined:

1. www.visitscotland.com
2. www.hotels.com

¹⁷ Cogentsi (2009) Appraisal of development projects in Argyll & Bute, CHORD.

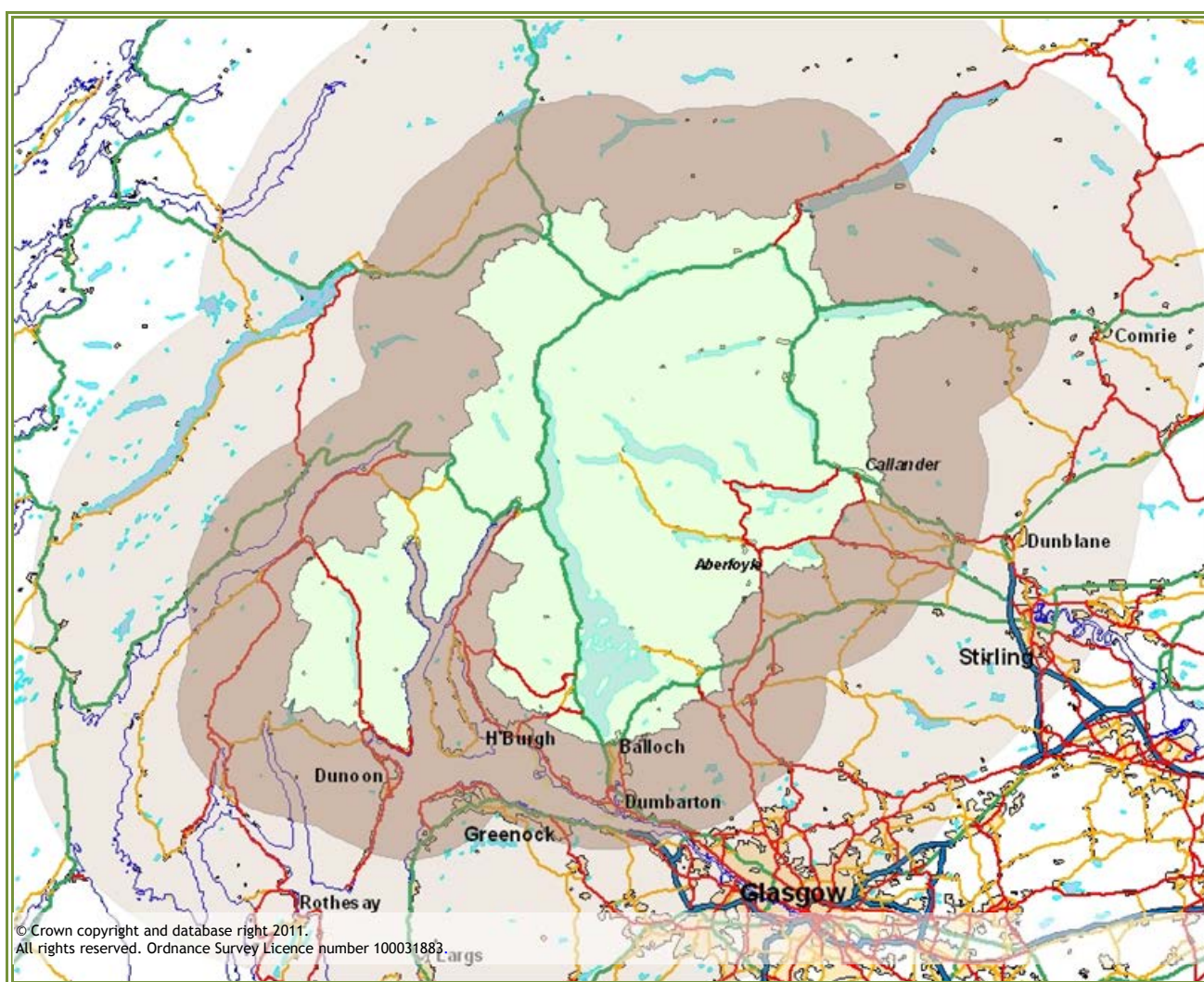
3. www.tripadvisor.com
4. www.loch-lomond.net
5. www.stayatlochlomond.com

Along with the physical aspects of the accommodation (type, size, location), website commentary was examined to identify if there was mention of:

- a) the landscape and natural environment (e.g. loch and mountains);
- b) the National Park by name.

The postcode was converted to a 12 figure grid reference using GeoConvert (MIMAS2010) and a shape point file of the accommodation added to the GIS map of the park and its surroundings. Buffers at 10km and 25km were created around the park area as in .

Figure 9.13 10 and 25 km buffer zones to National Park with major settlements



Accommodation establishments were subsequently coded according to distance to Park boundary, as shown in the following table.

Table 9.14 Classification of accommodation establishments according to postcode

Code	Description	Number Sampled
1	Within Park Boundary	180
2	Within 10km of Park Boundary	87
3	Between 10 and 25km from the Park	94

C. Analysis

Table 9.15 shows the number and percentage of establishments that refer to the surrounding landscape and to the National Park with reference to the distance from the Park boundary.

Table 9.15 Reference to National Park by distance

		Refer to the landscape & natural environment			Refer to the National Park by name			Total
		No	Yes	% Refer	No	Yes	% Refer	
Distance	In Park	51	129	71.7%	75	105	58.3%	180
	Within 10km	12	75	86.2%	41	46	52.9%	87
	10-25km	53	41	43.6%	89	5	5.3%	94
	>25km	9	8	47.1%	16	1	5.9%	17
Total		125	253	66.9%	221	157	41.5%	378

As might be expected, mentions of both the landscape/natural environment and the National Park decline with distance from scenic landscapes. However, mentions of the National Park show a very marked decline for accommodation establishments located 10kms or more from the National Park. **This suggests a strong halo effect within the 10km zone, with establishments trading on closeness to the park.**

To explore this further a similar analysis was undertaken by Postcode District.

To ensure a statistically robust analysis, only districts with significant numbers were assessed and there was no split between the area of the district inside and outside the park.

Table 9.16 Analysis of accommodation establishments' mentions of the landscape/natural environment and the National Park according to postcode district

		Refer to the landscape & natural environment			Refer to the National Park by name			Total
District	Settlement	No	Yes	% Refer	No	Yes	% Refer	
FK17	Callander	21	12	36.4%	5	28	84.8%	33
FK20	Tyndrum, Crianlarich	5	6	54.5%	3	8	72.7%	11
FK21	Killin	11	4	26.7%	3	12	80.0%	15
FK7	Stirling	5	8	61.5%	12	1	7.7%	13
FK8	Aberfoyle, W. Stirling	6	20	76.9%	15	11	42.3%	26
G1	Glasgow	10	0	0.0%	10	0	0.0%	10
G2	Glasgow	10	3	23.1%	13	0	0.0%	13
G3	Glasgow	11	3	21.4%	14	0	0.0%	14
G63	Drymen, Balfron, E. Loch Lomond	2	35	94.6%	18	19	51.4%	37
G83	Balloch, W. Loch Lomond	13	71	84.5%	47	37	44.0%	84
G84	Helensburgh	7	20	74.1%	8	19	70.4%	27
PA23	Dunoon, Rothesay	3	20	87.0%	17	6	26.1%	23
	Other	21	51	70.8%	56	16	22.2%	72
Total		125	253	66.9%	221	157	41.5%	378

The most notable feature of this table is the apparent importance of the National Park not only to the key settlements in the Park such as Callander, Tyndrum and Killin but also to Helensburgh which is located in the Halo of the park. A real surprise is the comparative lack of mention of the Park in many of the establishments actually located on the banks of Loch Lomond.

Table 9.17 presents the analysis of references to the landscape/environment features and to the National Park according to type of establishment.

Table 9.17 Analysis of mentions to the National Park and landscape/environment features by type of accommodation

Distance	Type accommodation	Refer to the landscape & natural environment			Refer to the National Park by name			Total
		No	Yes	Refer %	No	Yes	Refer %	
In Park	B&B and Guest House	32	56	63.6%	29	59	67.0%	88
	Self Catering and Hostel	7	43	86.0%	31	19	38.0%	50
	Hotel and Inn	12	30	71.4%	15	27	64.3%	42
	Total	51	129	71.7%	75	105	58.3%	180
<10km from Park	B&B and Guest House	5	36	87.8%	25	16	39.0%	41
	Self Catering and Hostel	0	27	100.0%	7	20	74.1%	27
	Hotel and Inn	7	12	63.2%	9	10	52.6%	19
	Total	12	75	86.2%	41	46	52.9%	87
10-25km from Park	B&B and Guest House	9	18	66.7%	25	2	7.4%	27
	Self Catering and Hostel	3	2	40.0%	4	1	20.0%	5
	Hotel and Inn	41	21	33.9%	60	2	3.2%	62
	Total	53	41	43.6%	89	5	5.3%	94
>25km from Park	B&B and Guest House	2	5	71.4%	6	1	14.3%	7
	Self Catering and Hostel	1	1	50.0%	2	0	0.0%	2
	Hotel and Inn	6	2	25.0%	8	0	0.0%	8
	Total	9	8	47.1%	16	1	5.9%	17
TOTAL	B&B and Guest House	48	115	70.6%	85	78	47.9%	163
	Self Catering and Hostel	11	73	86.9%	44	40	47.6%	84
	Hotel and Inn	66	65	49.6%	92	39	29.8%	131
	Total	125	253	66.9%	221	157	41.5%	378

It appears from this table that the halo effect differs between types. Self catering establishments and hostels within the Park do not appear to mention it but outside, particularly just outside, it is seen as an important factor. The apparent lack of interest by the hotel sector can be seen to be a function of the distribution of the sector which, in this database, tend to be located in the larger towns outside the park.

D. Conclusion

All cross tabulations were found to be statistically highly significant.

The analysis clearly shows that accommodation businesses located in the National Park and in the immediately adjacent halo (within 10km of the Park boundary) believe that the Park is a positive factor contributing towards tourists' decision making process to visit the area.

However, it is worth noting that the effect varies from place to place with the villages in the Trossachs and Helensburgh making most mention of the National Park whilst those located directly on the Loch do not mention the 'National Park' as much as might be expected.

Differences also occur when considering types of accommodation establishment. Only c. one third of self catering establishments located within the Park boundary mention the National Park by name. However, over three quarters of such businesses located in the immediate halo area (within 10km of the Park boundary) appear to make particularly high use of the "Close to" description. The opposite is true for Bed and Breakfasts and Guest Houses.

9.4.2 Implications for other areas

This report suggests that the economic development of the LLTNP has been satisfactory and the discussion above, that there is a halo effect around the park leading to faster economic development. Before concluding that there are positive welfare implications we require to know:

1. Is the development at the expense of other activities? For example if the expansion of the hotel sector is at the cost of a local textile firm because of a shortage of labour then there is unlikely to be any welfare gain. Since there is no significant unemployment in the Park Area, then employment creation is not likely to result in significantly increased welfare.
2. Is development transferring employment from one area in need to another area with little unemployment? For example expansion of employment in a halo area like Helensburgh from the Ayrshire Coast will probably lead to a welfare loss. Whilst this is predominantly true for Stirling and Perth park and halo areas, this is not the case, for West Dunbartonshire and Dunoon.

3. Is the presence of the National Park a positive influence in bringing visitors to Scotland? There is little evidence from the halo study that “titles” are as important as the knowledge, information and expectation of Scotland’s scenic beauty. Along with Loch Ness, Loch Lomond has a massively important role in bringing visitors to Scotland. In so far as Tourism is a critical element in development strategy, in expanding employment and income, the area potentially has a significant welfare value to Scotland as a whole. We, however, currently have no data or methodology which could try to identify this welfare stream.

9.5 Global services: conclusion

9.5.1 Summary

The discussion in this section concerned 4 areas where the Park was expected to have some impact on Scotland as a whole; Public Health, Carbon Sequestration & Sustainable Energy, Species Variability and Economic Development.

The research suggests that the value of the park to better Public Health is around £100m, a surprising and highly important outcome. The research suggests that all the benefits in the area of carbon and energy have probably been accounted for in tax subsidies and inflated prices for sustainable energy. We identify a value to the wider community from the conservation work of the Park of around £10m based on the Natura Case studies. Finally we examined the impact of the Park on Economic Development. Whilst we found a clear “halo” effect it was not clear if this had a positive or negative effect on economic development of Scotland as a whole. The only clear message is that Loch Lomond and or the National Park itself is a clearly recognised brand that will have a positive effect on visitor choice but have no method to identify the value of this brand.

9.6 Summary Value Tables

Table 9.18 and Table 9.19 illustrate how the value could be created and distributed.

9.6.1 Value production

Most of the costs are already allocated in other activities. As an example footpath costs have been allocated to Activities and National Park Ranger costs to Local and Visitor Services. Labour and Raw Materials should be based upon analysis of the additional costs underlying any activities to promote Public Health and Conservation. The figures here are illustrations which are believed to be of the right order of magnitude.

Table 9.18 The production of global services' value in the LLTNP

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Public Health	£95.4	£0.0	£0.1	£0.0	£95.5	£0.1	£95.4
Conservation	£10.6	£0.1	£0.5	£0.1	£11.3	£0.7	£10.6
Peat bog carbon sequestration	£2.4	£0.0	£0.0	£0.0	£2.4	£0.0	£2.4
Forestry carbon sequestration)	£5.0	£0.0	£0.0	£0.0	£5.0	£0.0	£5.0
Total	£113.4	£0.1	£0.6	£0.1	£114.2	£0.8	£113.4

9.6.2 Who received the value?

The distribution figures could include local residents, visitors and external suppliers as separate groups but as the partition of benefits is unknown and they are all included in both the Scottish Nation and the Global Community, allocating out seems largely irrelevant. It might be thought that the creation of attractive work opportunities in the Park was a local benefit. As discussed earlier, in line with Government guidance, where there is little or no unemployment, as in the Park, then there is assumed to be no benefit from creating employment opportunities.

The decision to put Public Health on a National basis and Conservation on a Global basis reflects the current emphasis, with global organisations taking the lead in conservation and sustainability issues and nations taking responsibility for their own health.

Table 9.19 The recipients of global services' value produced in the LLTNP

Recipient/ Value stream	TOTAL (matches previous table)	Local residents	Visitors	External Customers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival & non-excludable goods
	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)
Public health	£95.5	£0.1	£0	£0	£0	£95.4	£0	£0.0	£0.0
Conservation	£11.3	£0.6	£0	£0.10	£0	£0	£10.6	£0.0	£0.0
Peat bog carbon sequestration	£2.4	£0	£0	£0	£0	£0	£2.4	£0.0	£0.0
Forestry carbon sequestration	£5.0	£0	£0	£0	£0	£0	£5.0	£0.0	£0.0
Total	£114.2	£0.6	£0	£0	£0	£95.4	£18.0	£0.0	£0.0

10 The accounts

10.1 The production account: how the assets (and other inputs) create the value streams

It will be recalled that in the first account we show how the assets (and other inputs) create the value streams. Having quantified the value streams from a market point of view or from published regional and national accounts, in this section we take each of the value streams, and assess the assets and inputs that contribute to its production. Findings are presented in Table 10.1.

Figure 10.1 summarises the overall structure of the table, clearly highlighting the **remarkable feature that is the very large contribution of the natural assets to the production of value from the Park**. People, manufactured plant and buildings, and purchased consumables are important, but on a case by case judgement then overall the natural assets are what makes the Park work. This is in a sense an economic validation of designation. We presume that in another area, natural assets would not make the same contribution, being not so special.

Figure 10.1 Value Streams in the Production Account (Total)

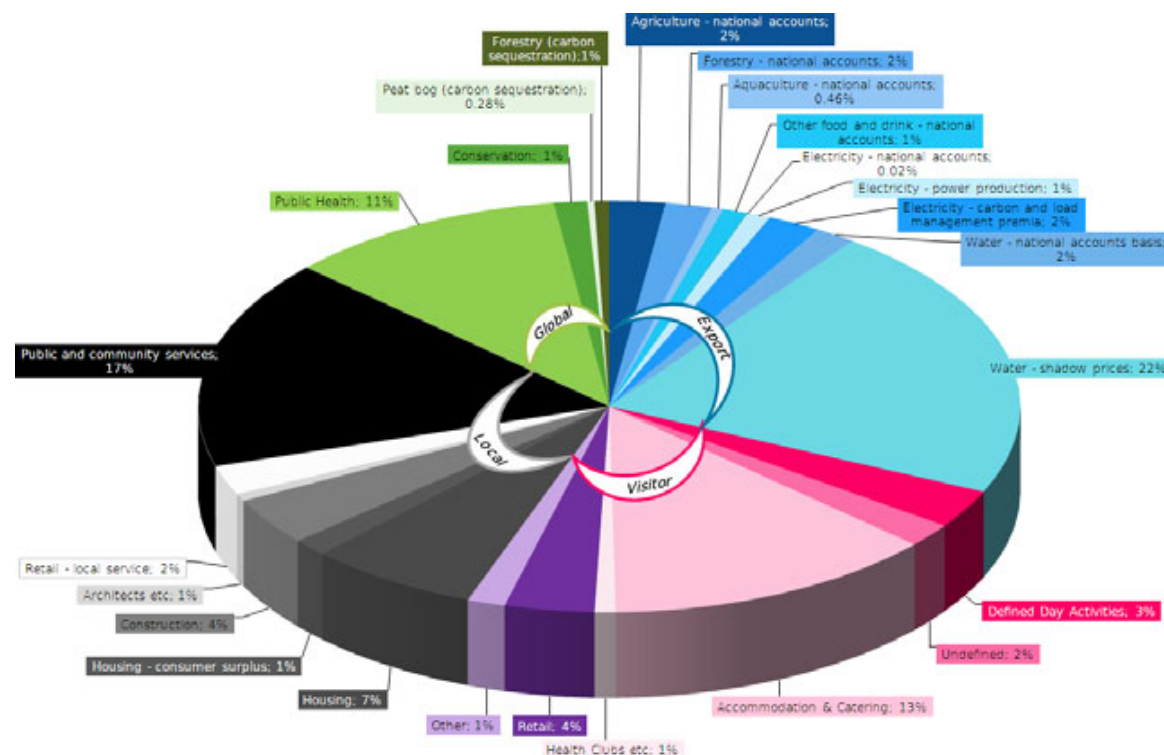


Table 10.1 The production account (use of assets and other inputs to create/generate goods and services)

Resource/ Activity (value stream)	Natural (Land)	Built and manufactured (Capital)	Human (Labour)	Materials and services	Total	Of which market	Non-market
Export	£158.8	£63.0	£19.5	£34.1	£275.4	£79.4	£196.1
Agriculture - national accounts	£1.0	£1.0	£10.0	£7.0	£19.0	£12.0	£7.0
Forestry - national accounts	£1.4	£1.4	£3.7	£9.4	£15.8	£14.9	£1.0
Aquaculture - national accounts	£0.1	£0.6	£0.8	£2.5	£4.0	£4.0	£0.0
Other food and drink - national accounts	£0.2	£0.6	£2.3	£5.4	£8.5	£8.5	£0.0
Electricity - national accounts	£0.0	£0.1	£0.0	£0.0	£0.1	£0.1	£0.0
Electricity - power production	£3.4	£3.4	£0.2	£1.0	£8.0	£8.0	£0.0
Electricity - carbon and load management premia	£10.0	£8.0	£0.0	£0.0	£18.0	£18.0	£0.0
Water - national accounts basis	£0.0	£2.6	£2.5	£8.8	£13.9	£13.9	£0.0
Water - shadow prices	£142.7	£45.4	£0.0	£0.0	£188.1	£0.0	£188.1
Visitor	£55.6	£43.4	£71.1	£35.9	£205.9	£153.4	£52.5
Defined day activities	£13.7	£4.0	£5.7	£2.8	£26.2	£12.5	£13.7
Undefined	£15.4	£0.8	£0.0	£0.0	£16.2	£0.0	£16.2
Accommodation & hospitality	£22.6	£31.7	£45.2	£13.5	£112.9	£90.4	£22.6
Health clubs etc	£0.4	£1.8	£4.6	£0.4	£7.1	£7.1	£0.0
Retail	£3.1	£3.0	£9.2	£15.3	£30.5	£30.5	£0.0
Other	£0.4	£2.2	£6.4	£3.9	£12.9	£12.9	£0.0
Local	£26.4	£22.2	£58.1	£163.8	£270.5	£89.5	£181.0
Housing	£9.0	£9.0	£3.0	£37.0	£58.0	£12.0	£46.0
Housing - consumer surplus	£12.0	£0.0	£0.0	£0.0	£12.0	£0.0	£12.0
Construction	£1.4	£2.7	£9.6	£18.8	£32.5	£32.5	£0.0
Architects etc	£0.0	£0.0	£1.5	£3.0	£5.0	£5.0	£0.0
Retail - local service	£0.0	£1.0	£4.0	£15.0	£20.0	£20.0	£0.0
Public and community services	£4.0	£9.0	£40.0	£90.0	£143.0	£20.0	£123.0
Global	£113.4	£0.1	£0.6	£0.1	£114.2	£0.8	£113.4
Public Health	£95.4	£0.0	£0.1	£0.0	£95.5	£0.1	£95.4
Conservation	£10.6	£0.1	£0.5	£0.1	£11.3	£0.7	£10.6
Peat bog (carbon sequestration)	£2.4	£0.0	£0.0	£0.0	£2.4	£0.0	£2.4
Forestry (carbon sequestration)	£5.0	£0.0	£0.0	£0.0	£5.0	£0.0	£5.0
Total	£354.2	£128.9	£149.3	£233.9	£866.0	£323.1	£543.0

The second remarkable feature overall is that **the majority of the value created by the Park does not pass through the marketplace** (and, indeed, is not counted in conventional accounting systems). In this case, if there was to be one place in Scotland where that was true, a National Park might be the one we would expect. That makes valuing the Park a good thing to do not only for the Park, but because the Park is a good place to highlight how our measurement system might be enhanced.

Looking at the detail of the table as assembled, two large, and possibly surprising, entries are **the values for water and public health**. The water figure is essentially there to correct undervaluations both in the marketplace and in the regional accounts system. For public health, where we have attempted to assess, necessarily rather crudely, the way in which one person's quality of life is enhanced if s/he lives in a society where other people are fitter and healthier - and in the case of the Park that exercise is motivated or facilitated by the Park's natural environment. We think it is salutary that these are both issues that since devolution have moved towards the top of the Scottish political agenda.

10.2 The benefits account: who benefits?

The previous section showed how in the production account each factor of production was mixed and otherwise combined to create a stream of value.

In this section setting out the benefit account we now describe who receives that value. Remember that in this table we are talking about who receives the value of the actual services produced by or in or through the Park, not the recipient of any money associated with the services.

For most conventionally accounted value streams, the recipient is of course the customer, whether that be a local resident, a visitor or a person or establishment outwith the Park. For many non-market value streams, such as physical recreation, it is the individual who brings it into being - indeed, it is frequently the idea of being the recipient that make her/him create it. For others, such as personal public services, it is the person receiving the service - care in a home, education in a primary school, or the emptying of bins. These activities essentially of consumption are all normally referred to as 'absorption'.

Some services or value streams directly go to building up the assets of the Park. This includes the planting of trees, much building work, and conservation efforts. These activities are recognisably investments, because they yield value for the future rather than now, and so they are referred to as 'accumulation'.

Table 10.2 Account 2: The beneficiary/absorption account (consumption of value streams to improve human welfare)

Resource/ Activity (value stream)	TOTAL (matches previous table)	Local residents	Visitors	External Customers	Other individually identifiable persons	The Scottish Nation	The global community	Transfer to Accumulation Account	Adjustment for non-rival & non- excludable goods
Export	£275.4	£2.2	£2.6	£138.6	£0.0	£37.6	£0.0	£94.4	£0.0
Agriculture - national accounts	£19.0	£0.6	£1.0	£17.1	£0.0	£0.0	£0.0	£0.4	£0.0
Forestry - national accounts	£15.8	£1.6	£0.0	£14.2	£0.0	£0.0	£0.0	£0.0	£0.0
Aquaculture - national accounts	£4.0	£0.0	£0.8	£3.2	£0.0	£0.0	£0.0	£0.0	£0.0
Other food and drink - national accounts	£8.5	£0.0	£0.9	£7.7	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - national accounts	£0.1	£0.0	£0.0	£0.1	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - power production	£8.0	£0.0	£0.0	£8.0	£0.0	£0.0	£0.0	£0.0	£0.0
Electricity - carbon & load management premia	£18.0	£0.0	£0.0	£18.0	£0.0	£0.0	£0.0	£0.0	£0.0
Water - national accounts basis	£13.9	£0.0	£0.0	£13.9	£0.0	£0.0	£0.0	£0.0	£0.0
Water - shadow prices	£188.1	£0.0	£0.0	£56.4	£0.0	£37.6	£0.0	£94.1	£0.0
Visitor	£205.9	£78.8	£49.8	£44.3	£3.8	£29.9	£0.0	-£0.8	£0.0
Defined day activities	£26.2	£10.6	£11.0	£2.0	£0.0	£2.5	£0.0	£0.0	£0.0
Undefined	£16.2	£0.4	£16.2	£0.4	£0.0	£0.0	£0.0	-£0.8	£0.0
Accommodation & hospitality	£113.0	£48.8	£22.6	£23.5	£0.0	£18.1	£0.0	£0.0	£0.0
Health clubs etc	£7.1	£4.4	£0.0	£1.0	£0.4	£1.4	£0.0	£0.0	£0.0
Retail	£30.5	£8.6	£0.0	£13.4	£3.0	£5.5	£0.0	£0.0	£0.0
Other	£12.9	£6.0	£0.0	£4.0	£0.4	£2.5	£0.0	£0.0	£0.0
Local	£270.5	£126.7	£22.3	£11.0	£0.0	£42.9	£0.0	£67.7	£0.0
Housing	£58.0	£58.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0
Housing - consumer surplus	£12.0	£12.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0
Construction	£32.5	£3.3	£0.0	£6.5	£0.0	£0.0	£0.0	£22.8	£0.0
Architects etc	£5.0	£0.5	£0.0	£2.5	£0.0	£0.0	£0.0	£2.0	£0.0
Retail - local service	£20.0	£10.0	£8.0	£2.0	£0.0	£0.0	£0.0	£0.0	£0.0
Public and community services	£143.0	£42.9	£14.3	£0.0	£0.0	£42.9	£0.0	£42.9	£0.0
Global	£114.2	£0.6	£0	£0	£0	£95.4	£18.0	£0.0	£0.0
Public Health	£95.5	£0.10	£0	£0	£0	£95.4	£0	£0.0	£0.0
Conservation	£11.3	£0.60	£0	£0.10	£0	£0	£10.6	£0.0	£0.0
Peat bog (carbon sequestration)	£2.4	£0	£0	£0	£0	£0	£2.4	£0.0	£0.0
Forestry (carbon sequestration)	£5.0	£0	£0	£0	£0	£0	£5.0	£0.0	£0.0
Total	£866.0	£208.3	£74.7	£194.0	£3.8	£205.8	£18.0	£161.3	£0.0

It should be noted again that this table is illustrative only and more detailed work is still required. However the results do suggest that both Scotland and local residents do receive considerable value from the Park.

10.3 The value of the National Park

The value of the National Park to a local resident facing a choice whether to move out or not will very clearly be different from the value of the National Park to the global community. Table 10.3 shows values under the three different definitions discussed in Chapter 2 and to the different interest groups.

Table 10.3 Value of the National Park

	Total	GVA	NEV
Local	£275.4	£241.3	£207.58
Visitors	£205.9	£170.0	£91.77
Scottish Residents	£270.5	£106.7	£45.07
Global Community	£114.2	£114.1	£107.82
Total	£866.0	£632.1	£452.2

In some cases the interests are cumulative i.e. a Resident will also be a member of the Scottish Nation and the Global Community. It is assumed that they take on the full value of, for example, Conservation.

11 Recommendations

As a result of undertaking this research the team has identified eight issues that need to be addressed in the short and long term

- a) Gaps in the data which make could make some of the other seven recommendations less valid;
- b) Health Promotion/Walking strategies
- c) Refining the transport strategy
- d) Exploiting tourist resources more effectively
- e) Combating a rapidly ageing population
- f) Completing the accounts to identify the long term sustainability of the Park.
- g) Evaluating Conservation Options
- h) Regularly monitoring changes in visitor activity

These are now discussed in detail.

11.1 Data gaps

A key feature of this report has been the absence of good quality data on Visitors and what they do. There are enormous difficulties in carrying out a comprehensive and accurate Visitor Survey without **an accurate assessment of the total number and distribution of visitors**. It is our belief that the Traffic Flow Analysis is probably the only way forward but there are two major deficiencies that must be addressed as a matter of urgency;

1. the percentage of visitors during the winter months;
2. the number of foot-based visitors coming to the National Park; in particular to Balloch Country Park.

Winter visitors

The assumption was made that on average 20% of vehicles entering the National Park at the identified points were visitors (including visitors in transit through the National Park). There is little statistical evidence for this assumption and this constitutes a major gap in our knowledge; if the average was 10% for example expected visitor numbers would fall from 7m to 4.9m. On the other hand 30% during the winter months would entail a rise in total visitor numbers to 9m. At 10% a number of anomalies arise (e.g. negative visitor numbers in some months) and 30% is simply thought to be too large.

One possibility is a vehicle intercept study but the numbers needing to be intercepted throughout the year would necessarily need to be large. Perhaps a joint project could be discussed with the Traffic Authorities.

As an alternative we suggest automatic 24/7 vehicle counting at some of the important car parks e.g. Lomond Shores, Luss, Aberfoyle, David Marshall Lodge, Callander and Arrochar. These will provide immediately monthly patterns and insight into the number of winter visitors into the Park. Daily data returns will also provide information on the impact of weather and, over time, will also provide information on emerging trends of use.

Foot based visitors

Since the turn of the twentieth century Loch Lomond has been a major draw for Glaswegians. In the early days public transport, particularly the railway to Balloch and Balloch Pier, was the normal access mode, and each year many millions either crossed the pier to the waiting Maid of the Loch and continued on to Luss, Balmaha, Rowardennan and Inversnaid or headed for Balloch Park.

We believe large numbers still come up on the train to Balloch, particularly on public holidays with good weather, but we have no knowledge whether that number is 50,000 or 500,000.

There are also substantial numbers throughout the year who utilise Balloch Country Park. In the absence of any concrete numbers in this study we have ignored any who walk across LLTNP boundary into the Country Park and have assumed the Country Park is simply a normal attraction for others. Understanding the utilisation of the Country Park is, in our view, essential.

It is our belief that a survey of people in the Country Park and of visitor numbers at Balloch station should be a high priority. The latter might be able to be incorporated in the regular surveys undertaken by Strathclyde Transport.

Activity survey

We are far from convinced that a Park wide activity survey will be accurate enough to provide policy guidance and that an expenditure survey will successfully be able to deal with issues of group payment and children. As discussed earlier, there are major problems in defining what is meant by an activity and in allocating a day to it. A significant majority of visitors simply “pootle”, wander around, look at the scenery and at shops, have coffee and go home. For minority activities such as kayaking or hill walking the sample size needs to be very large to obtain accuracy. For example the boat survey suggests that there are around 5,700 canoeing activity days in a total of 7,000,000 visitor days (0.0814%). To obtain an accuracy of 1000 days the sample size would need to be 195,804¹⁸.

If we combine that with problems of sampling sites appropriately so that they reflect what little is known about visitor splits and activity splits proportionately, our belief is that a traditional activity survey will add little to the information base. As importantly if the exercise is repeated in say 5 years any variances are more likely to reflect survey problems than trends.

Our view is that it is more important to count the level of activity on a consistent basis. Placing automatic counters on the most important hill, walking and cycling routes would seem a better investment.

11.2 Health promotion/walking strategies

The most surprising and important finding appears to be the value of the Park in maintaining and potentially promoting Public Health through activity. The NPA have clear policies to encourage both water and land based activity e.g. Transport Policy 7 reads

Development proposals will be required to:

- a) safeguard existing access rights by retaining, enhancing or providing appropriate alternatives to, core paths, rights of way, and the wider access network of formal and informal paths; and
- b) enable access opportunities for the public, including appropriate provision for existing and new users such as pedestrians, cyclists, and people with disabilities and to encourage local and longer-distance journeys by providing on-site access and appropriate safe links to the wider area.

In addition the authority has produced guides to popular walks such as those around Luss and offer Ranger led walks. Our analysis suggests that even though the authority is under financial pressure the returns from such initiatives are substantial and should not be withdrawn. Indeed we would recommend extending them using volunteers possibly in conjunction with the Health Authorities and local rambling groups. We suggest, for example, that a 7 day a week/ 52 weeks of the year programme of walks of varying length should be developed for the Park and published widely. We have seen such programmes elsewhere which have had notable success.

The development of linear walks, such as sections of the West Highland or Three Lochs Ways (or routes such as Carrick to Ardentinn, Luss to Glen Mallan, Rowardennan to Kinlochard) is only possible if there is return public transport. This is discussed in the next section.

11.3 Refining the transport strategy

The research had three clear messages

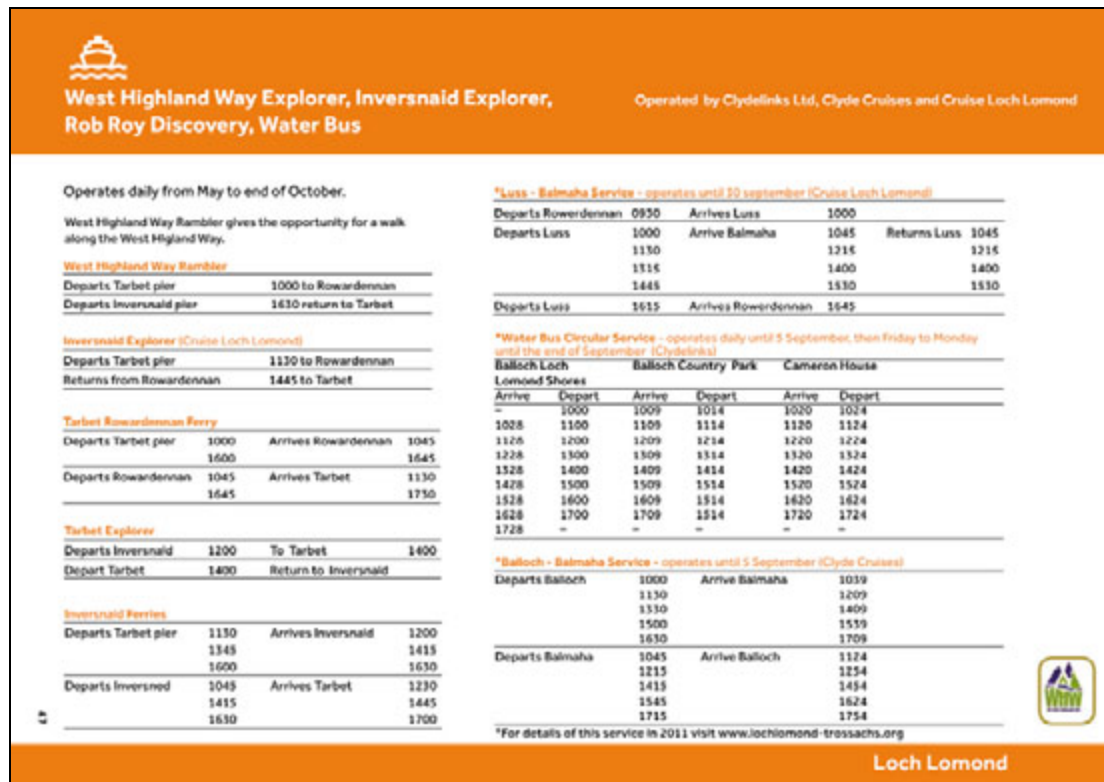
- a) Visits were overwhelmingly by car
- b) There was extensive car parking available but visitors tended towards locations close to urban areas such as Duck Bay, Luss and East Loch Lomond. Some areas, such as Argyll Forest Park (Loch Eck and Glen Branter) were noticeably quiet even at peak times.
- c) Use of public transport was minimal and, we surmise, heavily subsidised. It is known to be under threat as Councils face a squeeze on resources.

One result is that trunk routes such as the A82 become heavily congested at peak times.

The Park Authority recognises the desirability of a shift to public transport and has undertaken a number of initiatives such as promoting Loch Lomond ferry services (see Fig X.X) and the 4Bs bus service on west Loch Lomond.

¹⁸ Based on the SE of a proportion = $\sqrt{p(1-p)/n}$

Figure 11.1 Ferry services on Loch Lomond 2010



Responsibility for transport within the Park and subsidies remains, however, with the Local Authorities and whilst the NPA can promote services and the LA must take the Park Plan into consideration, rural transport subsidy is seen as a relatively easy method of cutting council expenditure. Services are thus likely to be under threat. It is essential that the NPA seek to maintain these services on the basis of potential value to the visitor as well as the local.

The documentation on public transport in and around the park is to be commended and hopefully will be continued in 2011.

11.4 Exploiting tourist resources more effectively

Transport from the urban areas to the south west of the park, the Argyll Forest Park and Loch Eck, is achieved either by a long car journey via Rest and Be Thankful or over the Clyde to Hunters Quay (Holy Loch). The passenger ferry service from Greenock and Helensburgh to Blairmore (and further on occasions) sadly disappeared after a one year trial (although the Waverley still offers a Wednesday service from Lags in summer).

Transport difficulties/costs appear to have led to under utilisation of tourist resources such as the downhill mountain bike track at Glen Branter (which is now under threat as cost cutting hits the maintenance budget of the Forestry Commission) and the paths at Puck's Glen. Promotion, with Western Ferries, of their Clyde Crossing as an alternative route, may be a possible option to expand usage of the area. It may also help to prevent further decline in the community at Ardentiny. It is difficult to see a solution to the continued decline of Carrick Castle now the pier has been removed.

Loch Eck and Glen Branter appear to offer both excellent level cycling and easy canoeing. If the tourist throughput can be increased, one could imagine a thriving bike and canoe hire business developing.

11.5 Combating a rapidly ageing population

Section 4.3 identified serious demographic problems likely in the medium to long term as planning restrictions in the Park are coupled with an ageing population. The housing difficulties of young couples with children are particularly acute in the LLTNP and many of this type of employee has to commute into the Park. The team believe that the current policies of promoting affordable housing may not be sufficient to cope with the decline in this age group. Current primary school closure programmes will not help.

One possible solution is to restart public housing programmes with eligibility criteria based on children at primary school age.

11.6 Completing the accounts to identify the long term sustainability of the Park

The study team is acutely aware that the Accounts as described in Chapter 2 are not complete. The register of assets is incomplete as is the evaluation of the built and human resources. No attempt has been made to identify new capital investment or the depreciation of existing assets. As a consequence we cannot report on the long term economic sustainability of the Park.

We would recommend that this work is undertaken, not least because it will provide a structure for examining how the Park is developing.

11.7 Evaluating Conservation Options

One of the many difficulties faced in the project was trying to put a value on the conservation work being undertaken in the Park. From the evidence at our disposal it became clear that no-one had attempted such an exercise and that programmes that were being undertaken seemed to reflect current political priorities over disappearance of species from specific locations, political influence (such as the salmon lobby) and attractiveness to the public. Each of these no doubt contributes to the value, but one would feel happier with conservation programmes if one knew that there was some systematic evaluation behind actions and some attempt to balance the use of a Ranger to, for example, distribute bat nesting boxes rather than lead countryside walks.

11.8 Monitoring

The monitoring to be undertaken will necessarily reflect the interests and objectives of the Park Authority. Visitor numbers is clearly of particular importance. It would seem sensible to ensure that monthly reports on visitor numbers derived from the traffic counters are generated and reported widely.

With such a high value, trends in the level and type of activity are likely to be of interest. We suggested above, the use of automatic counters at selected hill walks, paths and cycle tracks. Again we would recommend regular collection and distribution of the results.

The boat survey is extremely important and continuation in exactly the same format is necessary. It would be strengthened by maintaining the winter survey as in 2009 and implementing an evening survey.

Unemployment in the National Park area is available (via the data-zones) as a monthly series and this should be collected, analysed and published on a regular basis to provide insight into the local economy.

We would recommend subscription to the Visitor Attraction Monitor, tailored for the National Park, to provide an independent and authoritative analysis of visitor trends.

11.9 Conclusions

The team is acutely aware of the financial climate in which the NPA is working. We believe that understanding better what is going on in the Park is essential and that our report has been hampered by the lack of good data on visitors. Getting this data is not a luxury.

We are also clear that Public Health is a priority and that the NPA should consider its strategy towards providing healthy activities and in better utilising the many assets at its disposal to further this objective.

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Appendix 1: Moran's summary table of relevant landscape demand studies

Author	Country	Environmental Good	Proposed Good	Reference scenario	Population	Survey type	Relevant area	Method	Payment vehicle	Scenario devices	Year	Landscape category or attributes	Average values
Alvarez et al. (1999)	Scotland	Landscape and biodiversity. Grassland, cultivated Machair, dune systems, rare birds and flowers	Preservation Of traditional Agriculture with ESA	Current condition of Machair	UK public Residents of ESA Visitors to ESA	Postal & face to face	ESA, Machair in the Uists	CVM (O/E)	Income tax	Photos	1995	Agricultural landscape	13.44€/per s/yr (358)*
Bishop (1992)	Wales	Landscape and biodiversity	Preservation of agricultural land	Current	Park visitors	Face to face	Local park	CVM (O/E)	Entry price			Agricultural landscape	0.42€/visit (100)
					Park visitors	Face to face	Local park	CVM (O/E)	Annual entry			Agricultural landscape	18.53€/per s/yr (100)
Bishop (1992)	Wales	Landscape and biodiversity	Preservation of peri-urban forest	Current	Park visitors	Face to face	Local park	CVM (O/E)	Entry price			Agricultural landscape	0.54€/visit (100)
					Park visitors	Face to face	Local park	CVM (O/E)	Annual entry			Agricultural landscape	27.03€/per s/yr (100)
Bonnieux & Le Goffe (1997)	France	Landscape biodiversity And ecological functions	Préservation du bocage «traditional small fields and hedgerows	Current	Residents of the lower Normandy regional national park Residents on periphery	Face to face	Regional national park of Lower Normandy	CVM (DC)	Local Tax	Photos	1995	Landscape de bocage	201FF/hh/yr (400)
Bullock and Kay (1997)	Scotland	Southern uplands Landscape = Heather and tree coverage ; Biodiversity change as a result of grazing intensity	Reduction of intensive grazing	Current but respondents had to indicate their perceived status quo	Residents in Southern and central Scotland	Postal Face to face	ESA	CVM (DC)	Income tax	Photos	1994	Rural landscape rural (agriculture and forestry)	£3£ /pers/yr (459)

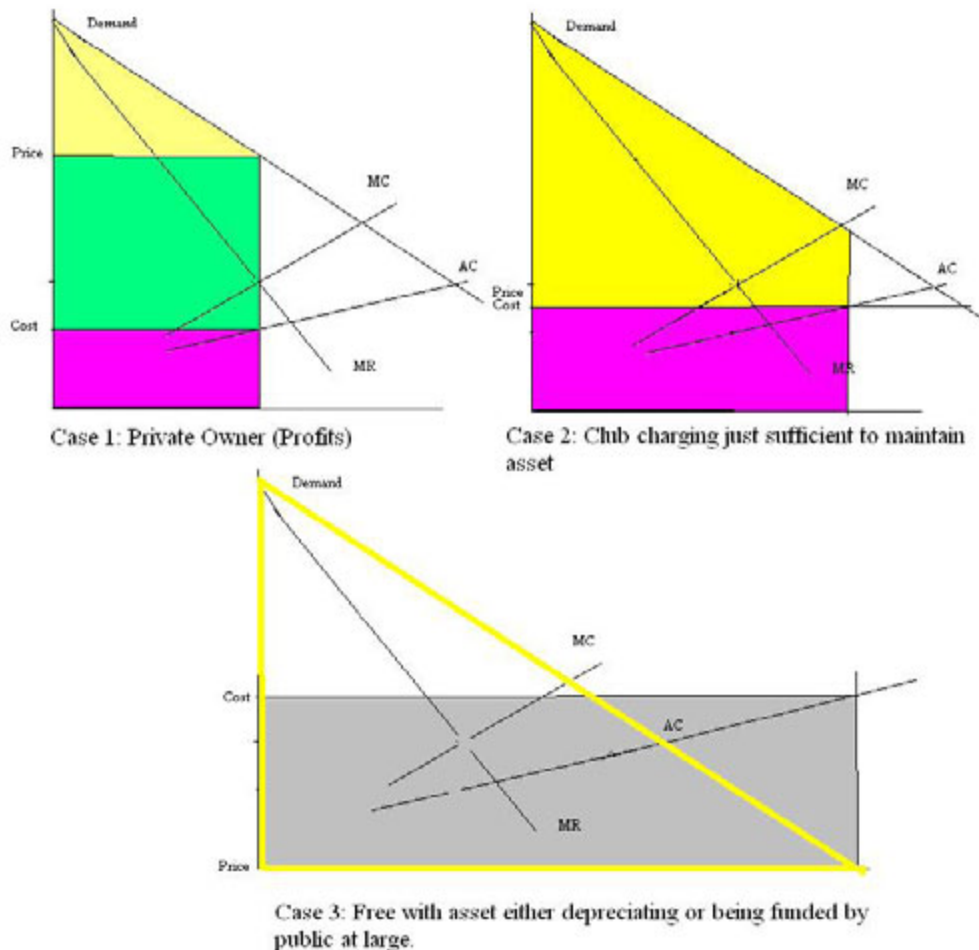
				Current	Residents of the region	Postal. Face to face	ESA		CVM (O/E)	Income tax	Photos	1994	Rural landscape (agricultural & forestry)	69£/pers/yr (88)
				Current	ESA visitors	Postal. Face to face	ESA		CVM (DC)	Income tax	Photos	1994	Rural landscape (agricultural & forestry)	55£/pers/yr (459)
				Current	ESA visitors	Postal. Face to face	ESA		CVM (O/E)	Income tax	Photos	1994	Rural landscape (agricultural & forestry)	49£/pers/yr (88)
Colson et Steiger (1996)	France	Landscape	Restoration des bocages Préservation des bocages	Current	Residents	Postal	Département de Loire Atlantique		CVM (O/E)		Photos	1994	Landscape bocager	103£/yr/m ge
					Residents	Postal	All agricultural Land		CVM (O/E)		Photos	1994	Landscape bocager	607£/yr/m ge
Drake (1992)	Denmark	Landscape, species diversity	Preservation of agricultural land instead of spruce forest	Current	Whole population	Face to face	Agricultural land in whole country		CVM (O/E)	Income tax	Photos	1986	Agricultural landscape	4655 crowns/pers/yr (1089)
				Current	Regional residents n.r Uppsala	Face to face	Agricultural land in whole country		CVM (O/E)	Income tax	Photos	1986	Agricultural landscape	68655 crowns/pers/yr (152)
Garrod et Willis (1992)	G.B.	Landscape and presence of forestry, Welsh borders Gloucestershire	Value of presence of attributes in housing: woodland, water and wetland	Current	Population		ESA		Hedonic pricing	Revealed preference		1992	Rural landscape	Presence of canal/river adds 4.9% to price; Wetlands <1km away reduces price by 18%; Urban view reduces by 5.7%; Woodland view - 7.3%
Garrod et Willis (1995)	G.B.	Landscape	Conservation of agricultural landscapes	Current	Population	Face to face	ESA		CVM	Tax	Photos	1992	Rural landscape	67.42£/hh/yr (237)
				Current	Population	Face to face	All ESAs		CVM	Tax	Photos	1992	Rural landscape	27.52£/hh/yr (218)
				Current	Visitors	Face to face	ESA		CVM	Tax	Photos	1992	Rural landscape	94.29£/pers/yr (237)
				Current	Visitors	Face to face	All ESAs		CVM	Tax	Photos	1992	Rural landscape	19.47£/pers/yr (220)
Giazzi et al. (2000)	Italy	Landscape	Preservation of agricultural landscapes	Current	Tourists	Face to face	National park		CVM (DC)	Daily charge	Photos	1997	Agricultural landscape	1euro/day/visit (344)
Hazley (1989)	Scotland	Landscape	Forest preservation	Current	Visitors	Face to face	Regional park		CVM (O/E)	Entry price	Description	1987	Forest landscape	0.80£/visit (1148)
Hazley et al. (1998)	Scotland	Landscape	Conservation and enhancement of landscape quality	Current	Residents	Face to face	ESA		CVM (DC)	Income tax	Photos	1995	Agricultural landscape	60£/hh/yr (249)
			Conservation and enhancement of landscape quality	Current	Residents	Postal	ESA		CVM (DC)	Income tax	Photos	1995	Agricultural landscape	47£/hh/yr (325)
			Conservation and enhancement of landscape quality	Current	Visitors	Face to face	ESA		CVM (DC)	Income tax	Photos	1995	Agricultural landscape	98£/hh/yr (325)
Hazley et al. (1998)	G.B.	Landscape	Forest management		Population	Face to face	National forest area		CE	Income tax			Essence	12.89£/hh/yr (284)
													Forme	13.90£/hh/yr
													Diversité des espèces	11.36£/hh/yr
Hazley et al. (1998)	G.B.	Landscape	Forest management		Population	Face to face	National forest area		CVM (O/E)	Income tax	Photos		Essence	11.73£/hh/yr (284)
													Forme	12.75£/hh/yr
													Species diversity	11.24£/hh/yr
Hazley et al. (2001)	England	Landscape	Hedgerows	Current	Population	Face to face	All agricultural land		CVM (O/E)	Donation	Description	2000	Hedgerows (10% increase)	1.56£/hh/yr (70)
														1.93£/hh/yr (130)
Hazley et al. (2001)	England	Landscape	Quality of field margins	Current	Population	Face to face	All agricultural land		CVM (O/E)	Donation	Description	2000	Field margins (10% increase)	2.84£/hh/yr (70)
														3.20£/hh/yr (130)
Nunes (2002)	Portugal	Landscape	Park protection from tourist pressure	Current	Tourists	Face to face	National park		CVM (DC)	Donation	Description	1997	Managed rural landscape	38euros/h/yr
				Current	Tourists	Face to face	National park		CVM (DC)	Donation	Description	1997	Wild rural landscape	49euros/h/yr

Pruckner (1995)	Austria	Landscape	Conservation of agricultural landscapes	Current	Tourists	Face to face	Tourist area	CVM (DC)	Transport costs (parking, bus, etc.)	Description	1991	Agricultural landscape	0.70 ecu/pers/day (2110)
Taylor et al. (1997)	G.B.	Landscape	Characteristics and quality of forest landscape	Uncertain	Resident Population	Face to face	Whole country	CVM (O/E)	Tax	Sketches	1997	Essence	10.97£/hh/yr (638)
												forêt organique	12.75£/hh/yr (638)
												Species diversity	11.24£/hh/yr (638)
												Ideal forest	29.16£/hh/yr (638)
Taylor et al. (1997)	G.B.	Landscape	Characteristics and quality of forest landscape	Uncertain	Resident population	Face to face	Whole country	CE	Tax	Sketches	1997	Essence	12.89£/hh/yr (284)
												forêt organique	13.90£/hh/yr (284)
												Species diversity	11.36£/hh/yr (284)
												Ideal forest	38.15£/hh/yr (284)
Tempesta (1998)	Italy	Landscape	Conservation of rural landscape		Residents	Face to face	Region	CVM (O/E)	Tax	Photos		Landscape rural	87.66£/lire t/hh/yr (284)
Santos (1998)	Portugal	Landscape	Preservation of rural landscape	Current	Tourists	Face to face	National park	CVM (DC)	Income tax	Photos	1994	Agricultural landscape	72.05£/hh/yr (2295)
Santos (1998)	G.B.	Landscape	Preservation of agricultural landscape	Current	Tourists	Face to face	National park	CVM DC	Income tax	Photos	1994	Agricultural landscape	11559£/scudos/hh/yr (3782)
Willis & Garrod (1993)	G.B.	Landscape	Conservation of current landscape	Uncertain	Residents	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	26.03£/hh/yr (300)
					Visitors	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	22.12£/hh/yr (300)
Willis & Garrod (1993)	G.B.	Landscape	Loss of traditional farms	Uncertain	Residents	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	7.67£/hh/yr (300)
					Visitors	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	23.75£/hh/yr (300)
Willis & Garrod (1993)	G.B.	Landscape	Conservation and enhancement of agricultural landscape	Uncertain	Residents	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	13.38£/hh/yr (300)
					Visitors	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Agricultural landscape	18.18£/hh/yr (300)
Willis & Garrod (1993)	G.B.	Landscape	Conversion of farms for tourism purposes	Uncertain	Residents	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Forest landscape And meadow	22.50£/hh/yr (300)
					Visitors	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Forest landscape And meadows	33.67£/hh/yr (300)
Willis & Garrod (1993)	G.B.	Landscape	Farm woodland	Uncertain	Residents	Face to face	National park	CVM (O/E)	Tax	Photos	1990	Forest landscape	26.75£/hh/yr (300)
					Visitors	Face to face	National park	CVM (O/E)	Local tax	Photos	1990	Forest landscape	34.20£/hh/yr (300)
Willis & Whurby (1983)	England	Landscape	Loss of pen urban green space	Uncertain	Residents	Face to face	Local	CVM (O/E)	Local tax	Verbal description	1982	Forest landscape	104£/hh/yr (103)

CVM : Contingent valuation method ; CE : Choice Experiment ;
(O/E) : open-ended question ; (DC) : Discrete choice ;
ESA : Environmentally Sensitive Area ;
/hh : perhousehold ; /pers : per person ; * : number of observations in brackets.

Appendix 3: the role of ownership in creating consumer surplus

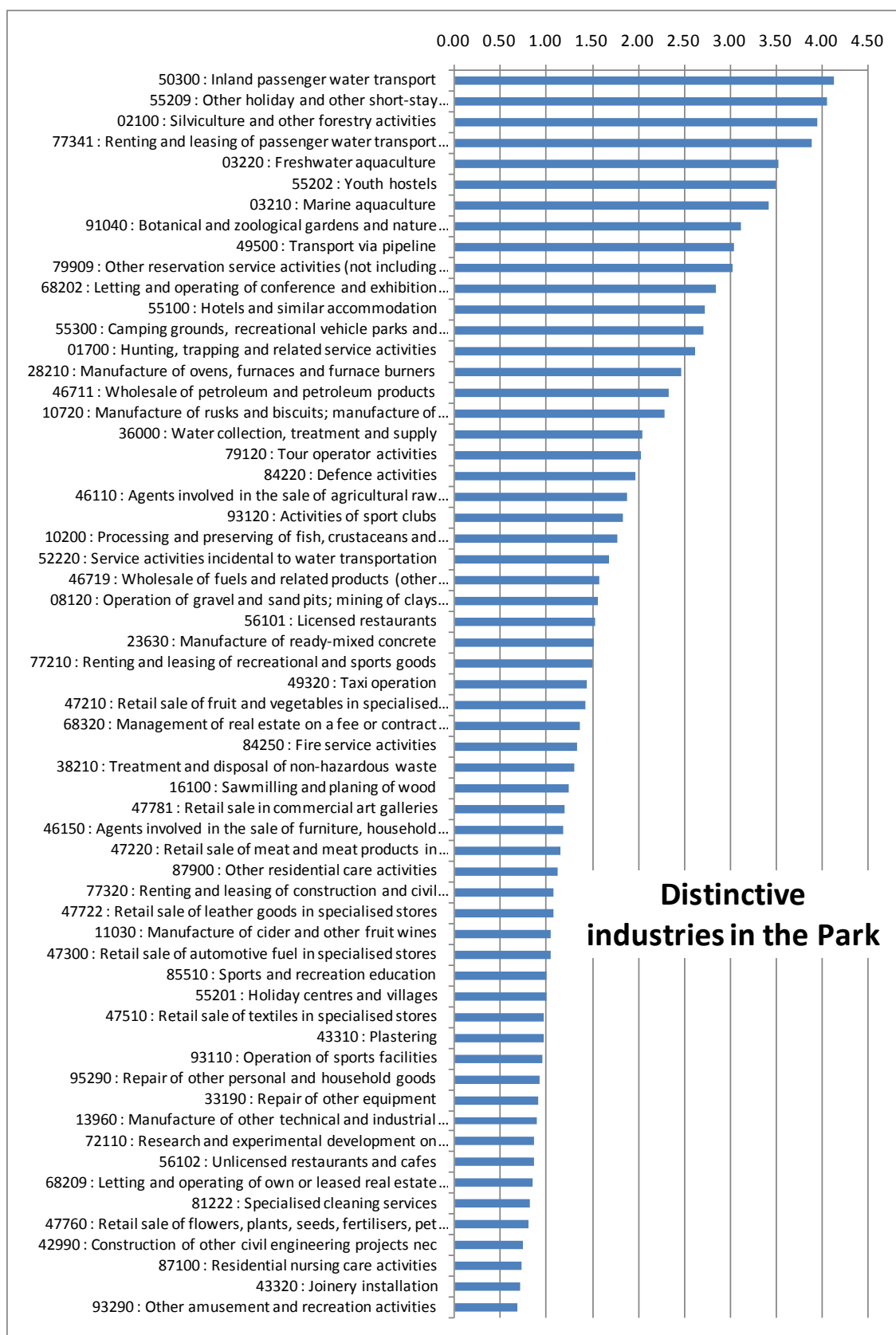
Figure 0.1 Fishing: the role of ownership in creating consumer surplus



In the case of Sea Angling the stock has so declined depreciation is minimal. Consequently the Value equates to the Consumer Surplus.

For freshwater angling, most fisheries are clubs and would appear to fall into category 2. In this case charges are made that ensure that capital value is maintained. The value in this case falls to the consumer by way of the surplus. It should be noted that this is not the case on most salmon rivers where the value of the natural asset is expropriated by the landowners. In many cases only 20 per cent of the benefit from public funding actually ends up with the public. It may well be that in some cases rent is being levied on the clubs by landowners. If this is the case then the value will be underestimated.

Appendix 4: employment-based competitiveness

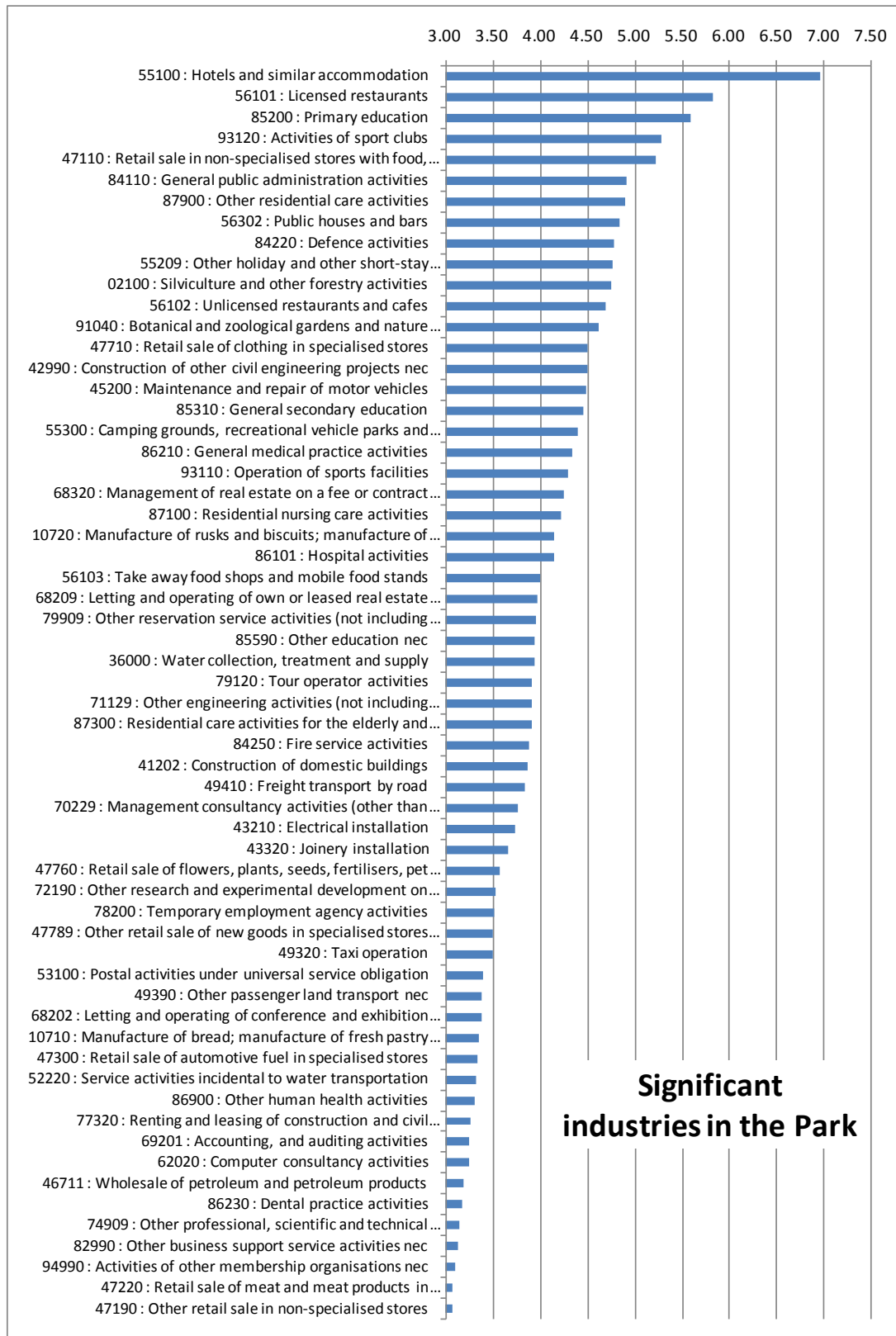


At first view, we would say that this particular statistical filter has here done a very good job of identifying industries with special characteristics appropriate to this particular National Park.

Secondly, we note the largest industries in the Park, bearing in mind that this is in part a product of the classification system.

The top ten include at the top SIC 55100, the hotel industry, followed by SIC 56101, licensed restaurants. Public services in the top ten are Primary education, general public administration and defence (although this sits on the boundary of the Park). Private services are sports clubs (including golf), pubs, care homes, mixed shops selling some food, and bed and breakfast/self catering holiday accommodation.

Numerical details cannot be released due to statistical confidentiality. However we can combine size with the measure of distinctiveness as for many purposes it is helpful to focus on industries which are both 'special' and 'big'.



Appendix 5: calculations identifying impact of the National Park on health

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.918948					
R Square	0.844466					
Adjusted R Square	0.844418					
Standard Error	740.7468					
Observations	6505					
ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	1.94E+10	9.69E+09	17651.16	0	
Residual	6502	3.57E+09	548705.8			
Total	6504	2.29E+10				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	5689.766	15.91586	357.4903	0	5658.566	5720.967
LLTNP	-411.654	178.4064	-2.3074	0.021064	-761.39	-61.9193
Poor	-152.883	0.813972	-187.823	0	-154.478	-151.287